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Research Product 82-09

M1 ABRAMS TANK PROCEDURE GUIDES

ARI Field Unit at Fort Knox, Kentucky
Training Research Laboratory

July 1982

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20. (Continued)

the TM. The Procedure Guides follow the TM to the extent possible. They use flow-chart-like symbols to identify procedural steps where decisions have to be made or recursive operations begin. The MI Procedure Guides will be distributed to tank crews in plastic binders that will protect each page from the dirt and grease of the armor work environment.

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M1 ABRAMS TANK PROCEDURE GUIDES

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Education and Training

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FOREWORD

The Army Research Institute-Ft Knox Field Unit has been working toward solution of training and performance problems that result from the Army's acquisition of sophisticated new weapons systems. The research has focused on the development and fielding of the M1 Abrams Tank. Problems in personnel selection and assignment, individual and crew training, and training and performance in units are being investigated by the Weapons System Training Team at Fort Knox.

The M1 "Abrams" Tank requires crewmen to perform a number of long procedural tasks to prepare for and secure after combat operations. The primary document for information on performance of these tasks is the tank operator's technical manual, TM-9-2350-255-10. The TM is to be used in training and as an aid in performing tasks in operational units. In operational testing of the M1 it was observed that many preoperational tasks were not being performed correctly and the TM was frequently not being used. Features of the TM, such as its large size, its being designed for novice performers, and its detailed task descriptions could have contributed causing these problems. Also since there is only one TM per tank it cannot be used by crewmen who must simultaneously power up their stations.

This research product, M1 Procedure Guides, was designed to provide M1 crewmen with a job aid that they could use to perform the procedural tasks necessary to prepare for and secure from combat operations. The Procedure Guides present sufficient information for Armor crewmen who have been previously trained to perform M1 tasks. They are grouped by duty station and use a flow chart format to handle decision making and recursive operations. In operational settings the procedures guides are each packaged in plastic binders to protect them from the dirt and grease of the tank work environment. Each page is inserted in a plastic cover to allow for pages to be replaced as changes are made.

Pending the outcome of tests of the effectiveness of the guides, plans are to distribute them when soldiers go through M1, 19K One Station Unit Training and to each M1 battalion as it undergoes transition training. Use of job aids such as the Procedure Guides should impact on the effectiveness and availability of the M1 weapons system.


JOSEPH ZEIDNER
Technical Director

M1 ABRAMS TANK PROCEDURE GUIDES

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INTRODUCTION

The Army Research Institute has developed a set of M1 Procedure Guides to meet a perceived need by M1 tank crewmen for detailed procedural task information in a form that would be readily available to them, complete, and usable in the tank work environment. The procedure guides were designed to aid in performance of the noncombat tasks that are required to prepare the M1 tank for combat and power it down after operations. The guides provide each crewmember a convenient, accurate, and comprehensive document which identifies the tasks at his station and the tasks' procedures.

The M1 Procedure Guides were designed to overcome problems that seem to exist with using the tank's operator's manual, TM 9-2350-255-10, as a day to day job aid for performing procedural tasks. The operator's manual is formatted using Skill Performance Aid (SPA) guidelines. Tasks are highly proceduralized. Each task in the manual is described by an extensive verbal description of task steps and a series of illustrations. The task detailing is designed to allow novice performers to complete tasks; this level of detail is probably inappropriate for the needs of experienced M1 crewmen. Also, the use of elaborate task detailing has resulted in a large manual (three inches thick). Although it is divided in three sections, the sections must be kept together because the index for the entire manual is located only in the last section. Because of its size the manual is cumbersome to use. It is difficult to keep open on crewmen's laps.

The most serious problem with using the operator's manual to perform procedural tasks is that there is only one issued per tank. Since each crewman has pre and post operations tasks to perform, at least three soldiers will have to do the tasks without the aid of the manual. Unavailability of adequate task information forces soldiers to rely on their memories to recall task steps. Past research has shown that tasks that are as long and complicated, as are many that

must be performed on the M1 tank, cannot be performed accurately for very long after training based solely on soldier's recall.^{1, 2}

M1 Procedure Guides are designed to serve as job aids for experienced crewmen to use in performance of the M1's noncombat procedural tasks. Since many of the M1's tasks are fairly complicated and require crewmen to decide between alternative behaviors, a checklist format which simply lists task steps was not appropriate. For example, the procedure for zeroing the main gun contains 16 potential decision points within more than 100 procedural steps. To overcome this problem, an "algorithmic" type checklist was developed to incorporate those decisions. A set of algorithmic characteristics (guidelines) were established to ensure uniformity in the task descriptions. These characteristics are as follows:

- Algorithms present clear and concise procedures required for successful task performance.

- Information included in the procedures is restricted to only that which is necessary to perform the task.

- Language used in the procedure steps is unambiguous and at a level appropriate for the users.

- Algorithms make use of symbology when possible. Original symbology new to system operators will be defined prior to presentation in the procedure.

- Notes/cautions/warnings which impact task performance, safety, or system integrity are identified at appropriate places within the procedures.

¹Goldberg, S.L., Drillings, M., and Dressel, J.D. Mastery Training: Effects on Skill Retention. US Army Research Institute, Technical Report 513, Alexandria, VA, March 1981.

²Shields, J.L., Goldberg, S.L., and Dressel, J.D. Retention of Basic Soldiering Skills. US Army Research Institute, Research Report 1225, Alexandria, VA, Sep 1979.

- All decision points occurring during task performance are identified.

At these decision points the user is asked a question. Based upon the user's answer (formulated internally) the appropriate succeeding steps will be identified. This branching technique requires that:

- All decision points occurring in the procedure must be identified.
- All possible alternative actions/procedures be identified and detailed.
- Each algorithm is presented independently of others -- that is, each will begin on a separate page in the procedure guides.
- Each algorithm possesses obvious start and finish points.
- Duplication of any "common" subprocedures is to be avoided. For those subprocedures found in a task, a separate algorithm is developed for that subprocedure. This avoids unnecessarily lengthy and repetitive procedures.
- Necessary pictures or illustrations are included in each procedure guide.
- Each procedure guide contains a table of contents which allows the user to rapidly locate the desired procedure (task).
- The physical dimensions of the procedure guides should be tailored to their intended use and environment. That is, procedure guide size should take into account space required and available for use, storage requirements, and frequency of anticipated or required use.

The algorithms that were produced account for most (if not all) of the unique occurrences within tasks. A procedure guide booklet has been produced for each M1 tank crew position. A total of sixty-four tasks are presented across the four guides. Tables 1 through 4 list all tasks included in the Driver, Loader, Gunner, and Tank Commander Procedure Guides. In addition, before, during, and after operations preventive maintenance checks and services (PMCS) activities are

Table 1. Tank Commander Procedure Guides

ACTIVITIES

Prepare Station

Enter Station

Power Up Station/Turret

Install Weapon - Cal .50

Install Weapon - M240

Prepare to Fire Checks

Boresight the Cal .50

Zero the Cal .50

Secure Station

Remove Weapon - Cal .50

Remove Weapon - M240

Secure Station and Turret

Power Down Station and Turret

Clear the Cal .50

Set Headspace and Timing - Cal .50

Clear the M240

Operate/Secure Gas Particulate Filter

Before Operations PMCS

Master Check-Off List - Before Operations PMCS

Master Check-Off List - During Operations PMCS

Master Check-Off List - After Operations PMCS

Table 2. Gunner Procedure Guides

ACTIVITIES

Prepare Station
Enter Station
Install Coaxial Machinegun
Power Up Station
Perform GPS Functional Check
Perform GPS Adjustments
Perform Computer Data Check
Perform TIS Checkout
Perform GAS Adjustments
Perform Computer Self Test
Test Fire Control System
Perform Lead System Check
Perform Firing Circuits Check
Perform Crosswind Circuits Check
Prepare to Fire Checks
Update Muzzle Reference Sensor
Manual Inputs to Automatic Fire Control Data
Manual Inputs to Fire Control Data
Zero Coaxial Machinegun
Boresight the Main Gun
Zero the Main Gun
Secure Station
Remove Coaxial Machinegun
Power Down Station
Clear Coaxial Machinegun
Operate/Secure Gas Particulate Filter
Before Operations PMCS
After Operations PMCS

Table 3. Driver Procedure Guides

ACTIVITIES

Prepare Station
Enter Station
Power Up Hull Systems
Start Engine
After Start Checks
Secure Station
Shut Down Engine
Power Down Hull Systems
Exit Tank
Operate/Secure Gas Particulate Filter
Before Operations PMCS
During Operations PMCS
After Operations PMCS

Table 4. Loader Procedure Guides

ACTIVITIES

Prepare Station
Install Weapon
Enter Station
Power Up Station
Secure Station
Power Down Station
Remove the M240 Machinegun
Unload (Clear) Main Gun
Manually Extract a Main Gun Round
Clear the M240 Machinegun
Operate/Secure Gas Particulate Filter
Before Operations PMCS
After Operations PMCS

identified in each crew member's guide for the PMCS checks at his station. The tank commander's guide also contains a master list of PMCS checks for each crew station. The tank commander can use this list to supervise and keep track of the conduct of PMCS. The guides are packaged in plastic binders to protect them from the grease and grime of the tank work environment. Each page is inserted in a plastic cover. This has the advantage of protecting the page and allows for easy substitution of pages as changes in procedures are posted.

The M1 Procedure Guides are designed to be supplements to, not replacements for, the M1's operator's manual. Procedures in the guides follow the operator's manual's procedures as closely as possible. If a soldier does encounter a situation not covered by the guide, he should refer back to the operator's manual for complete information on the task. Furthermore, the operator's manual should be used for initial task training. Only after the soldier is familiar with the location of equipment and task terminology should he begin to use the procedure guide to perform a given task.

Soldiers will require training on use of the procedures guides. The "algorithmic" style of task formatting and certain abbreviations will be unfamiliar to many soldiers. Learning to use the guides properly and command emphasis on their continued use should result in more careful and accurate performance of pre and post operations tasks.

Many of the training hours on the M1 tank or any other tank are spent learning procedures. The unavailability of the TM in most situations and no adequate job aids has required crewmen to memorize most procedures. The use of effective job aids would preclude the need to spend as much training time as is presently spent on procedural tasks. Soldiers would be able to go from task to task after ensuring that they knew the locations of various task referenced equipment and had

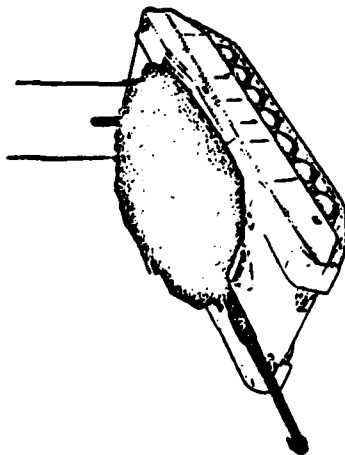
gone through the steps using the procedures guide. Effective use of job aids or procedure guides could conceivably free up considerable training time that could then be used to train on skilled performance tasks.

The M1 tank is a complex weapon system that incorporates many technological improvements within its mechanical and fire control systems. Many of the combat functions that depended on human performance accuracy in earlier tanks are performed by the M1's automated systems. The importance of proper operation of these systems is such that the tank's overall capability and firepower can be significantly affected by system failure or improper use. Continued use of job aids such as the procedure guides that follow should contribute to maintaining the M1 tank and ensure its effectiveness on the battlefield.

TANK COMMANDER

PROCEDURE GUIDES

M1 TANK



JULY 1981

PREPARED BY THE U. S. ARMY RESEARCH INSTITUTE
FOR THE
BEHAVIORAL AND SOCIAL SCIENCES

GENERAL INFORMATION

This booklet contains M1 tank commander procedure guides. Each guide is for a single pre-operation, post-operation, or during operation activity. Each guide is matched to TM-9-2350-235-10 (Operator's Manual for Tank, Combat, Full-Tracked, 105 MM, M1).

PURPOSE OF PROCEDURE GUIDES

The guides in this booklet will not take the place of the M1 TM or M1 training materials. The guides will aid you in remembering long or difficult sets of procedures. In short, the guides will help to "jog your memory."

USE OF THIS BOOKLET

The Table of Contents (on the next page) lists the procedure guides in this booklet. Each guide gives you a step-by-step outline for completing an activity. The following will help you to better use each guide.

1. Some steps within a procedure guide are followed by a page number. On that page you will find a detailed breakdown of the step.



2. Some of the procedure guides include a question(s). Each question is stated inside a diamond shape. Your "yes" or "no" to the question will show you which path to follow.



3. Some steps within a procedure guide are followed by a box. In the box you will find more information on the step or a caution/warning.



4. Certain steps within a procedure guide require that a knob or switch be turned to a certain position. In some cases, that position might be written like the symbol to the left. The symbol means that a light should also come on.

5. Master check-off lists of all before, during, and after operations PHCS performed by crewmembers are included as an aid in your supervision of these activities.

6. Pictures of selected panels/equipment can be found at the end of this booklet.

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PREPARE STATION

1. TC Enter station (page 2)
2. Station/turret . . Power up (page 3)
3. Downlight. Adjust
4. Intercom Adjust
5. Seat/footrest. . . . Adjust
6. Hatch. Adjust
7. Platforms. Adjust
8. Weapon Install (page 5)
9. Knee guard Adjust
10. GPS extension. . . . Adjust






ENTER STATION

1. Loader's hatch . . . Unlock/open
2. TC Enter tank
3. GUN/TURRET DRIVE . -~~MANUAL~~-
4. Turret traverse
lock Locked
5. Ejection guard . . . Forward
6. TC Enter station
7. CWS elevation
crank safety . . . SAFE





POWER UP STATION/TURRET

1. VEHICLE MASTER
POWER 
or
TURRET POWER . . . 
2. ENGINE FIRE
light Off
3. CKT BREAKER
OPEN light Off
4. FIRE CONTROL
HALF light Off
5. LOW BAT CHG
light Off
6. 

NO

YES

AUX HYD PWR 


7. AUX HYD PWR. . . . OFF

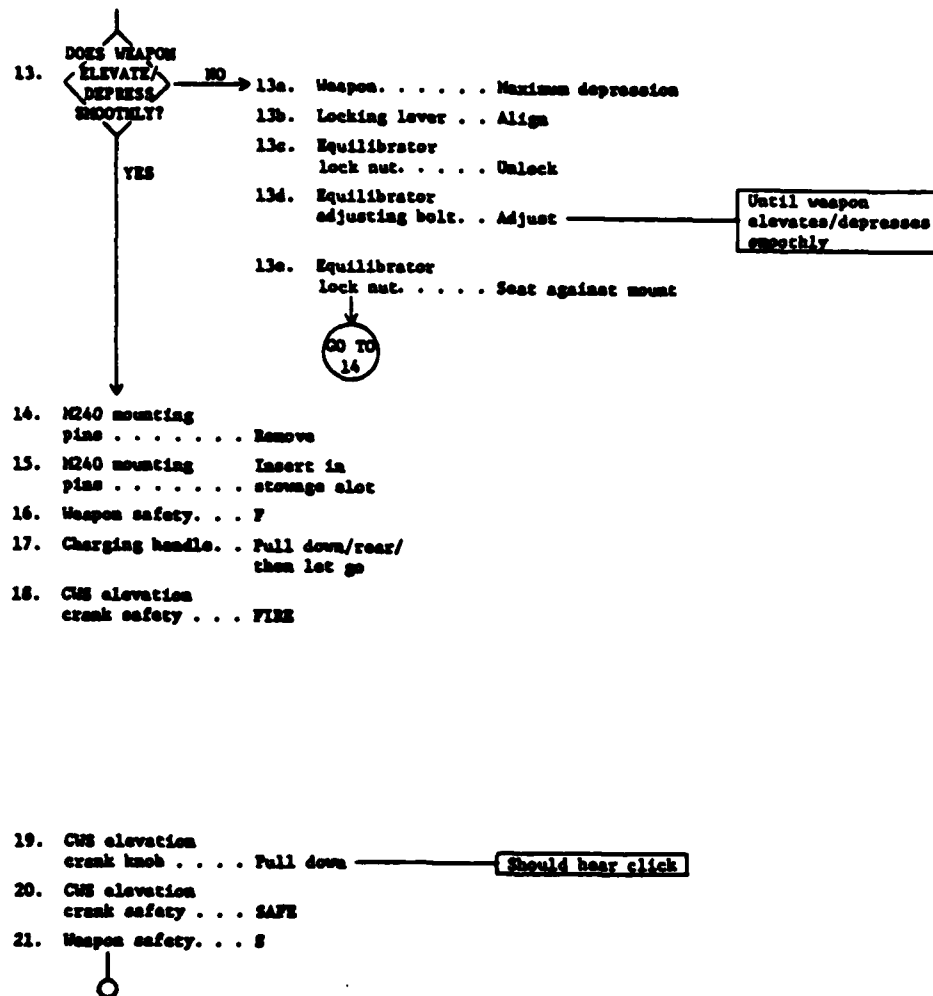
8. PANEL LIGHTS
test button. . . . Press
9. Panel lights Adjust brightness

All TC and loader
panel lights on



INSTALL WEAPON - CAL.50

1. Weapon Clear (page 20)
2. CMS elevation
crank safety SAFE
3. Hatch. Pull open
4. Mount. Level
5. Mount. Lock
6. Cal.50 mounting
pins Remove
7. Receiver In mount
8. Butterfly
trigger. Under mount
firing lever
9. Receiver holes Lined up with
mount holes
10. Cal.50 mounting
pins Insert
11. Barrel Install
12. Headspace/timing Set (page 22)

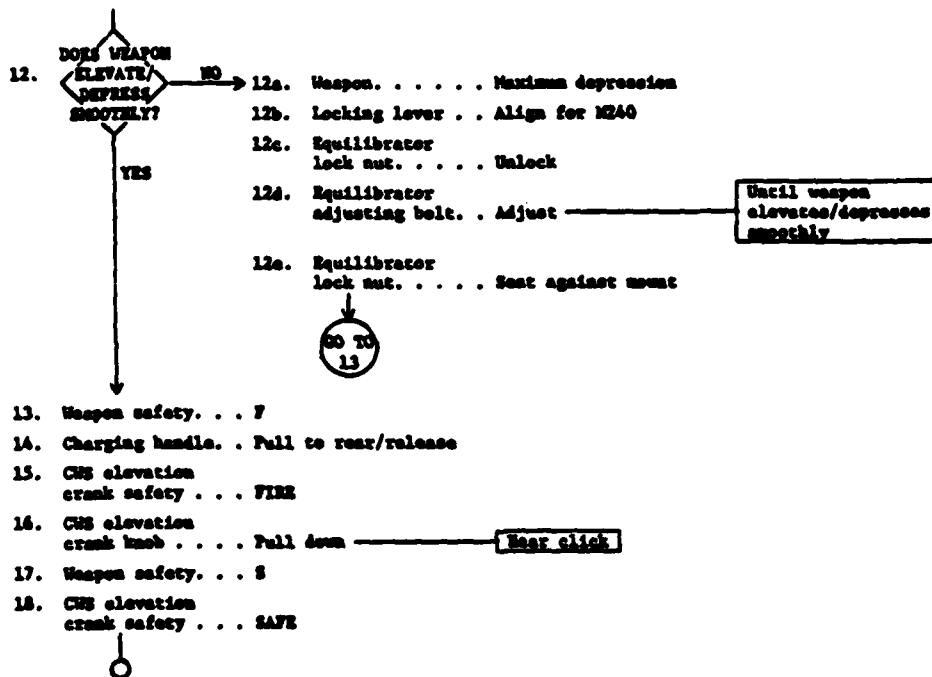


INSTALL WEAPON - M240

1. Weapon Clear (page 26)
2. CMS elevation crank safety . . . SAFE
3. M240 mounting pins Remove
4. Weapon Put in mount
5. Front/rear receiver holes . . mount holes
6. M240 mounting pins Install
7. Trigger cable bight. Remove from storage
8. Trigger cable bight. Connect
9. Trigger cable wing nut Loosen
10. Trigger cable. . . Tight around trigger
11. Trigger cable wing nut Tighten

Around weapon
charger guide/
over trigger

Do not depress
trigger



PREPARE TO FIRE CHECKS

1. Weapon Check mounting/ammunition stowage/operation
2. Cal.50 Bore sight (page 11)
3. Cal.50 Zero (page 13)



BORESIGHT THE CAL.50

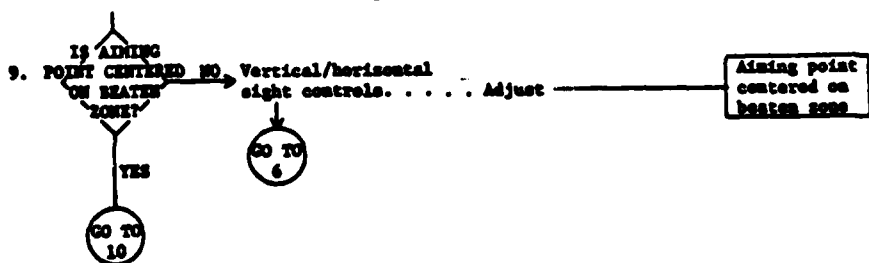
1. Tank position. . . Level
2. Bore sight target . Right angle/500 meters
3. Weapon Clear (page 20)
4. Rear mounting pin. Remove
5. Rear of weapon . . Lift above firing lever
6. Bolt Forward
7. Weapon cover . . . Open
8. Backplate. Remove
9. Bolt group Remove
10. Rear of weapon . . Lower
11. Rear mounting pin. Insert
12. Center of barrel . Align on upper left target corner
13. CMG/weapon Do not move
14. Bore sight cross. . Align on upper left target corner
15. CMG elevation crank. Elevate/depress gun

16. Center of barrel . Align on upper left target corner
17. Foresight cross. . Assure on upper left target corner
18. Rear mounting pin. Remove
19. Rear of weapon . . Lift above firing lever
20. Bolt group Install
21. Backplate. Install
22. Weapon cover Close
23. Headspace and timing Check/adjust (page 22)



ZERO THE CAL.50

1. Weapon Foresight (page 11)
2. Weapon Load
3. Butterfly trigger safety . . F
4. TC Announce "Cal.50"
5. CMS elevation crank safety . . . FIRE
6. Sight/500 meter Center of target/
aiming point 500 meters Use manual controls
7. CMS elevation crank knob Pull down/fire 10-20 round bursts
8. Target beaten Compare to sight
sone reticle aiming point



10. CMS elevation
crank safety . . . SAFE
11. Butterfly
trigger safety . . S
12. Weapon Clear (page 20)



SECURE STATION

1. Weapon Remove (page 16)
2. Station/turret . . Secure (page 18)
3. Station/turret . . Power down (page 19)
4. TC Eric tank



REMOVE WEAPON - CAL.50

1. Weapon Clear (page 20)
2. Charging handle. . Full rear/held
3. Barrel Unscrew/remove
4. Charging handle. . Release
5. Mounting pins. . . Remove
6. Receiver Lift from mount
7. Mounting pins. . . Insert

Locking spring lug
should be seen



REMOVE WEAPON - M240

1. Weapon Clear (page 26)
2. Weapon/mount . . . Maximum depression
3. Trigger cable
tight. Disconnect
4. Trigger cable. . . Connect in storage
position
5. Front/rear
mounting pins. . . Remove
6. Weapon Lift from mount

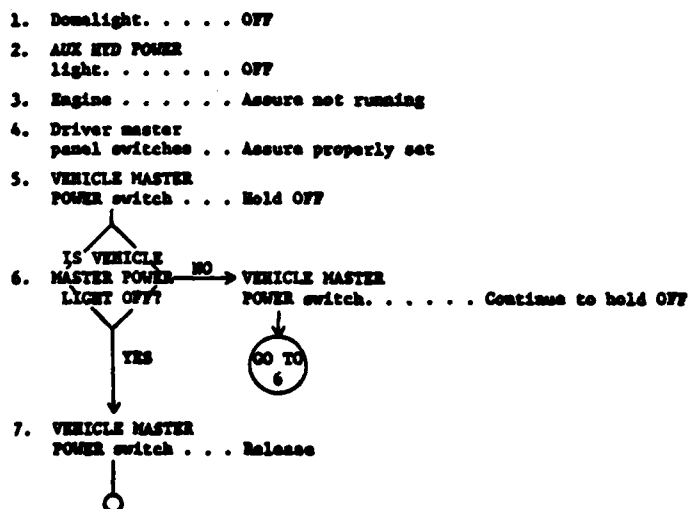


SECURE STATION AND TURRET

1. Gunner/loader stations Powered down
2. CWS MANUAL/POWER lever. POWER
3. Loader's panel MANUAL light On
4. GPS MANUAL light . On
5. Elevation travel lock Lock
6. Ejection guard . . Forward
7. Turret traverse lock Lock
8. CVC helmet Remove/disconnect
9. TC hatch Close

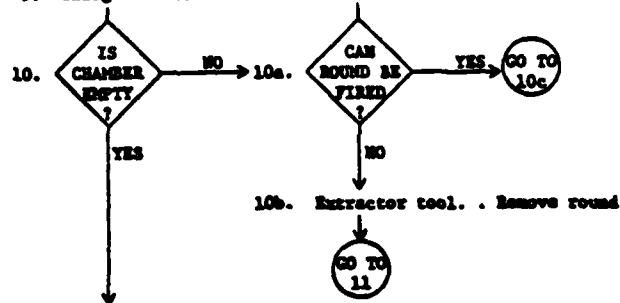
MAIN GUN STATUS
SAFE light on

POWER DOWN STATION AND TURRET



CLEAR THE CAL.50

1. Weapon Point down range
2. CMS elevation
crank safety . . . SAFE
3. Weapon safety. . . S
4. Receiver cover . . Open
5. Extractor. Lift from ammo belt
6. Ammo belt. Remove from receiver
7. Ammo belt. Put in ammo box
8. M10 charger belt
locking latch. . . Engage
9. Charger handle . . Pull back



- 10c. Receiver cover. . Down/latch
- 10d. M10 charger belt
locking latch . . Release
- 10e. Charger bolt. . . Let go
- 10f. Weapon safety . . F
- 10g. Butterfly
trigger Fire round
- 10h. Weapon safety . . SAFE
- 10i. Receiving cover . Open

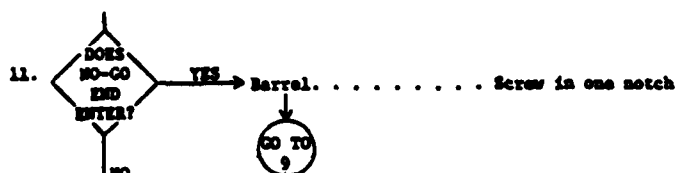
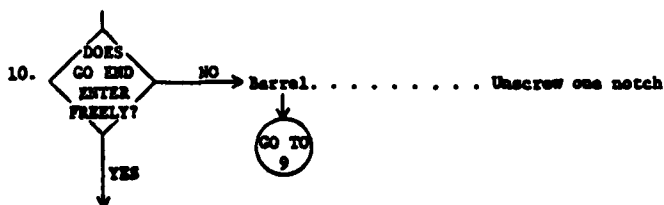


11. M10 charger belt
locking latch. . . Disengage
12. Charger handle . . Let go
13. Weapon safety. . . F
14. Receiver cover . . Close/latch
15. Butterfly
trigger. Press
16. Weapon safety. . . S

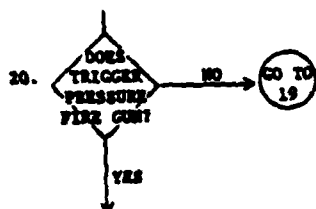
To release
firing pin

SET HEADSPACE AND TIMING - CAL.50

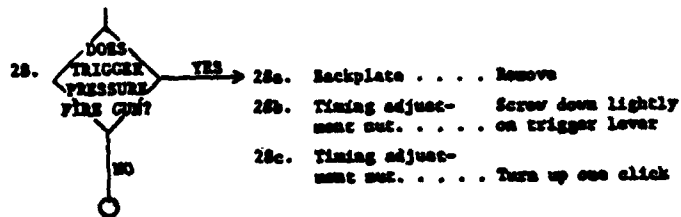
1. Weapon cover . . . Raise
2. Recoiling parts. . Retract
3. Barrel Screw all the way into extension
4. Barrel Loosen two notches
5. Charging handle. . Pull rear/hold
6. Bolt latch release. Press
7. Charging handle. . Release slowly ——— Do not depress trigger
8. Charging handle. . Pull back ——— Until extension is 1/16 inch from trigger block
9. Headspace gage/GO end Insert in T slot



12. Weapon Cock
13. Charging handle. . Pull back
14. FIRE gage. Beveled edge against barrel notches
15. Charging handle. . Release
16. Backplate. Remove
17. Timing adjust-ment nut Screw down lightly on trigger lever
18. Trigger. Strong pressure ——— Gun should not fire
19. Timing adjust-ment nut Turn up one click



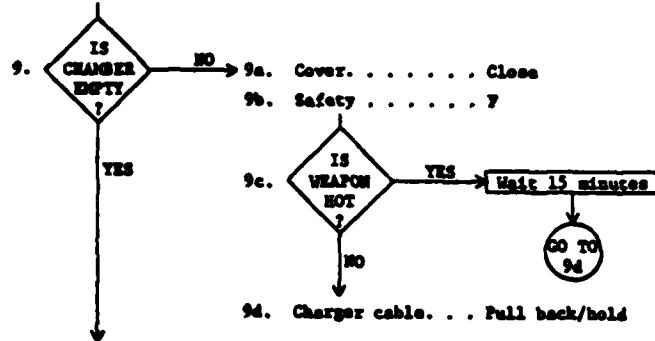
- 21. Timing adjustment out Turn up two clicks
- 22. Backplate. Replace
- 23. FIRE gage. Remove
- 24. Weapon Cock
- 25. Bolt latch Push/ease bolt release. forward
- 26. Charging handle. . Pull back
- 27. NO FIRE gage . . . Insert




- 28d. Trigger Depress Firing pin should not release
 - 28e. NO FIRE gage. . . Remove
 - 28f. FIRE gage Insert
 - 28g. Trigger Depress Firing pin should release
-

CLEAR THE M240

1. Weapon Point down range
2. Safety F
3. Charger cable. . . Pull to rear
4. Safety S
5. Latches. Push in
6. Cover. Pull straight up
7. Bolt Off feed tray
8. Feed tray. Raise



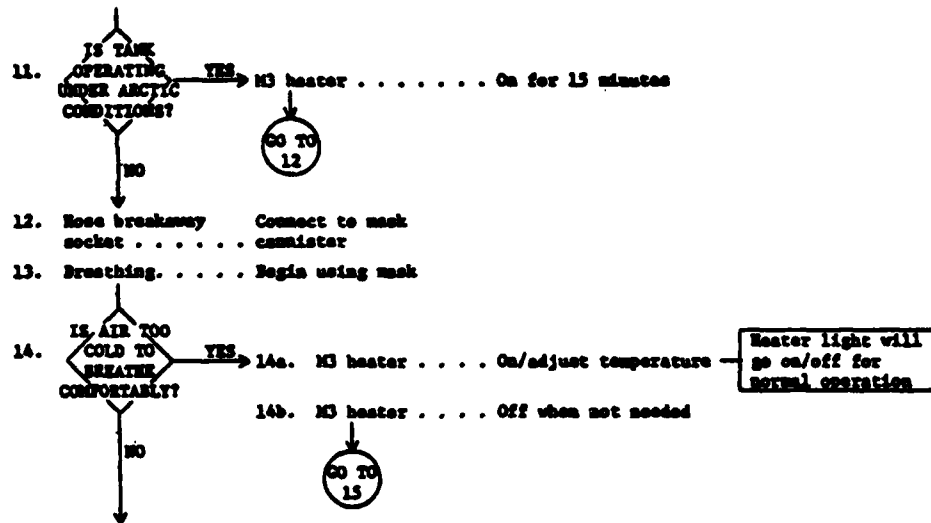
- 9e. Trigger. Push/hold forward
 9f. Charger cable. . . Slowly forward until stops, then let go
 9g. Trigger. Release
 9h. Charger cable. . . Pull to rear → Bullet should drop


10. Cover. Close
 11. Safety F
 12. Charger cable. . . Pull back/hold
 13. Trigger. Push/hold forward
 14. Charger cable. . . Slowly forward until stops, then let go
 15. Trigger. Release
 16. Safety S

OPERATE/SECURE GAS PARTICULATE FILTER

Operate

1. VEHICLE MASTER POWER. Assure ON
2. Station. Power up
3. Turret Power up
4. GAS PARTIC FILTER ON (driver)
5. Mask On
6. Mask Clear and seal
7. Mike lead. Disconnect from connector
8. Mask mike lead Hook up to connector
9. Spring clip. Remove from intake opening (loader)
10. Hose breakaway socket Remove from mount



Secure

15. Hose breakaway socket Disconnect from mask cannister
16. Hose breakaway socket Connect to mount

17. Mask mike lead . . . Disconnect from connector
18. Mike lead. Connect to connector
19. Mask Off/stow
20. GAS PARTIC
FILTER OFF (driver)
21. Spring clip. Reinstall (loader)



BEFORE OPERATIONS PMCS

Tank Commander's Station

1. GAS PARTIC
FILTER On (driver)
2. Spring clip. Remove from intake opening (loader)
3. Filtered air hose Remove from connector
4. Airflow. Should be felt
5. Heater On
6. Heater Off
7. Mask Check operation
8. Mike Check operation

Heater lamp
lights and heater
are working



**TANK COMMANDER MASTER CHECK-OFF L'ST
BEFORE OPERATIONS PMCS**

			CHECK											
Location	System	Equipment	Clean/Clear	Damage/Tampering	In place	Leaks	Level	Missing Parts	Operation	Position	Pressure	Secure	Status	Tension
Exterior	Vehicle	General	X					X						
	Track	Track												X
	Hull Access Plates	Hull Access Plates			X							X		
	Rear Grille Doors	Rear Grille Doors								X		X		
	Missile Reference Sensor	Missile Reference Sensor		X								X		
Lenses			X	X										
Hull	Fuel Tanks	Filler Covers			X							X		
		Brackets		X	X									
	Batteries	Condition Indicator			X								X	
	Precooler	Sponson Air Intake Grille	X											
		Top and Seal Assembly	X	X										
	Transmission Oil	Transmission Oil				X	X							
	Engine Oil	Engine Oil				X	X							
	Fire Extinguisher Sensor Lenses	Sensor Lenses	X	X										

			CHECK												
Location	System	Equipment	Clean/Clear	Damage/Tampering	In Place	Leaks	Level	Missing Parts	Operation	Position	Pressure	Secure	Status	Tension	
Leader's Station	Fire Extinguisher System	Bottle Pressure Gage										X			
		Bottles											X		
		Sensor Lenses	X												
	Hydraulic System	Oil Reservoir			X	X									
		Filter Bypass Buttons								X					
	Communication System	Radio/Intercom													
	GAS Particulate Filter	Airflow							X						
Heater								X							
Mask/Mike								X							
Gunner's Station	Main Accumulator	Main Accumulator			X			X			X				
	AUX HYD Pump	AUX HYD Pump						X			X				
	Gun/Turret	Power Controls							X						
		Manual Controls							X						
		AZ Filter Servo Button									X				
		EL Filter Servo Button									X				
		Hydraulic Lines			X										
		Hydraulic Pressure Gage										X			
		GAS Particulate Filter	Airflow						X						
	Heater							X							
	Mask/Mike							X							

			CHECK												
Location	System	Equipment	Clean/Clear	Damage/Tampering	In Place	Leak	Level	Missing Parts	Operation	Position	Pressure	Secure	Status	Tension	
Driver's Station	Fire Extinguisher System	Bottle Pressure Gage									X				
		Bottles										X			
		Sensor Lenses	X												
	Parking Brake System	Hydraulic Pressure Gage									X				
		Lights/Instruments												X	
	Engine (During and After Start)	Air Scavenge Blower							X						
		Domelight		X					X						
	Lights	Lenses/Cables		X											
		Exterior							X						
		Hatch							X						
	Compartment	Hatch Seal		X											
		Periscopes		X											
		Seat		X					X						
	GAS Particulate Filter	Airflow							X						
		Heater							X						
		Mask/Mike							X						

**TANK COMMANDER MASTER CHECK-OFF LIST
DURING OPERATIONS PMCS**

			CHECK													
Location	System	Equipment	Alignment	Chucking/Separation	Damage/Tampering	Heat	In Place	Leaks	Level	Missing Parts	Operation	Presence of Water	Seated	Secure	Tension	
Exterior	Track	Track													X	
	Roadwheel/ Compensating Idler Wheel Assemblies	Hubs				X		X								
		Hub Oil							X				X			
		Hub Plugs								X						
		Arms			X				X							
		Wheels			X						X					
		Wheel Rubber		X												
		Wearplates			X						X				X	
	Shock Absorber	Mounting Nuts/Bolts									X				X	
		Sight Gage							X	X			X			
		Housing					X									
	Torsion Bars	Bars			X					X					X	
	Track Assembly	Shoes	X													
		Centerguides			X						X				X	
		Wedges									X			X	X	
		End Connector Bolts									X				X	

			CHECK													
Location	System	Equipment	Alignment	Chunking/Separation	Damage/Tampering	Heat	In Place	Leaks	Level	Missing Parts	Operation	Presence of Water	Seated	Secure	Tension	
Exterior (Cont'd)	Support Roller Assembly	Hubs				X										
		Wheels			X											
		Spindle Supports								X					X	
		Support Roller Hub Caps			X			X							X	
	Hub and Sprocket Assembly	Sprocket		X						X			X	X		
		Hub		X						X				X		
Hull	Fuel Tanks	Track Retainer		X						X				X		
		Filler Covers					X								X	
		Brackets			X		X									
Driver's Station	Controls/ Instruments	Steer Control									X					
		Throttle Control									X					
		Service Brakes										X				
		Parking Brake										X				
	Compartment	Seat			X						X					

**TANK COMMANDER MASTER CHECK-OFF LIST
AFTER OPERATIONS PMCS**

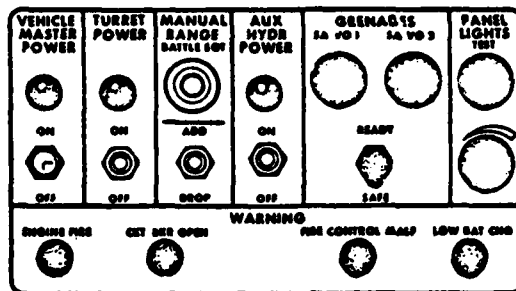
			CHECK																	
Location	System	Equipment	Alignment	Chunking/Separation	Clean/Clear	Damage/Tampering	Heat	In Place	Leaks	Level	Missing Parts	Operation	Position	Presence of Water	Pressure	Seated	Secure	Tension	Wear	
Exterior	Vehicle	General				X					X									
		Drain Valves							X					X						
		Tank			X															
		Tarpaulin						X												
	Track	Track																	X	
	Adjusting Link Assembly	Hardware/ Fittings										X						X		
		Lock Bolts										X						X		
		Relief Valve								X										
		Hubs					X			X										
	Roadwheel/ Compensating Idler Wheel Assemblies	Hub Oil									X				X					
		Hub Plugs										X								
		Arms			X					X										
		Wheels			X							X								
		Wheel Rubber	X																	
		Wearplates				X						X						X		

			CHECK												
Location	System	Equipment	Alignment	Chunking/Separation	Clean/Clear	Damage/Tampering	Heat	In Place	Leaks	Level	Missing Parts	Operation	Position	Presence of Water	Pressure
Exterior (Cont'd)	Roadwheel/etc. (Cont'd)	Mounting Nuts/Bolts													
		Shock Absorber													
	Torsion Bars	Sight Gage													
		Housing													
	Track Assembly	Bars													
		Shoes	X												
		Centerguides													
		Wedges													
		End Connec- tor Bolts													
	Support Roller Assembly	Hubs													
		Wheels													
		Spindle Sup- ports													
		Support Roller Hub Caps													
	Hub and Sprocket Assembly	Sprocket													
		Hub													
		Track Retainer													

			CHECK												
Location	System	Equipment	Alignment	Chunking/Separation	Clean/Clear	Damage/Tampering	Heat	In Place	Leaks	Level	Missing Parts	Operation	Position	Presence of Water	Pressure
Exterior (Cont'd)	Skirt Panels, Fenders, and Mud Guards	Hinges, Latches, and Support Struts													
		Skirts, Fend- ers, and Mud Guards													
	Roll Access Plates	Roll Access Plates													
	Rear Grille Doors	Rear Grille Doors													
	Missile Refer- ence Sensor	Missile Refer- ence Sensor													
		Lenses													
Hull	Precleaner	Sponson Air Intake Grille													
		Top and Seal Assembly													
	Transmission Oil	Transmission Oil													

			CHECK												
Location	System	Equipment	Alignment	Chunking/Separation	Clean/Clear	Damage/Tampering	Heat	In Place	Leaks	Level	Missing Parts	Operation	Position	Presence of Water	Pressure
Hull (Cont'd)	Engine Oil	Engine Oil							X	X					
	Fire Extinguisher Sensor Lenses	Sensor Lenses			X	X									
	Engine Hydraulics and Heat Exchanger	Engine Hydraulics						X							X
		Heat Exchanger			X			X							X
	Hydraulic System	Oil Reservoir						X	X						
		Filter Bypass Buttons											X		
Loader's Station	Loader's Panel	Panel										X			
Gunner's Station	Gun/Turret	Power Controls										X			
		Manual Controls										X			
		AZ Filter Servo Button											X		

			CHECK												
Location	System	Equipment	Alignment	Chunking/Separation	Clean/Clear	Damage/Tampering	Heat	In Place	Leaks	Level	Missing Parts	Operation	Position	Presence of Water	Pressure
Gunner's Station (Cont'd)	Gun/Turret (Cont'd)	EL Filter Servo Button											X		
		Hydraulic Lines							X						
		Hydraulic Pressure Gage												X	
Driver's Station	Lights	Domelight				X						X			
		Lenses/Cables				X									
		Exterior										X			
	Compartment	Hatch										X			
		Hatch Seal				X									
		Periscopes			X										
		Seat				X						X			

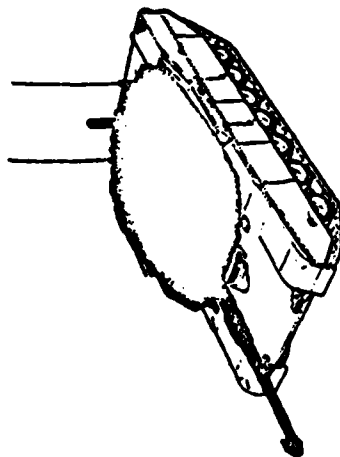


COMMANDER'S PANEL

GUNNER

PROCEDURE GUIDES

M1 TANK



JULY 1981

PREPARED BY THE U.S. ARMY RESEARCH INSTITUTE
FOR THE
BEHAVIORAL AND SOCIAL SCIENCES

GENERAL INFORMATION

This booklet contains M1 gunner procedure guides. Each guide is for a single pre-operation, post-operation, or during operation activity. Each guide is matched to TM-9-2350-255-10 (Operator's Manual for Tank, Combat, Full-Tracked, 105 MM, M1).

PURPOSE OF PROCEDURE GUIDES

The guides in this booklet will not take the place of the M1 TM or M1 training materials. The guides will aid you in remembering long or difficult sets of procedures. In short, the guides will help to "jog your memory."

USE OF THIS BOOKLET

The Table of Contents (on the next page) lists the procedure guides in this booklet. Each guide gives you a step-by-step outline for completing an activity. The following will help you to better use each guide.

1. Some steps within a procedure guide are followed by a page number. On that page you will find a detailed breakdown of the step.



2. Some of the procedure guides include a question(s). Each question is stated inside a diamond shape. Your "yes" or "no" to the question will show you which path to follow.



3. Some steps within a procedure guide are followed by a box. In the box you will find more information on the step or a caution/warning.



4. Certain steps within a procedure guide require that a knob or switch be turned to a certain position. In some cases, that position might be written like the symbol to the left. The symbol means that a light should also come on.

5. Pictures of selected panels/equipment can be found at the end of this booklet.

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ADDITIONAL ACTIVITIES

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PREPARE STATION

1. Gunner Enter station (page 3)
2. GUN/TURRET DRIVE . MANUAL
3. Turret traverse lock Lock
4. Turret power . . . ON
5. Seat Adjust
6. Domelight Adjust
7. Weapon Install (page 4)
8. Intercom Adjust
9. Chestrest Position for firing
10. Browpade Adjust
11. Station Power up (page 5)
12. GPS functional check Perform (page 7)
13. GPS adjustments . . Perform (page 9)
14. Computer self test Perform (page 18)
15. Computer data check Perform (page 10)
16. TIS checkout Perform (page 13)

17. GAS adjustments. . Perform (page 17)
18. Fire control
system Test (page 21)




ENTER STATION

1. Loader's hatch . . Unlock/open
2. GUN/TURRET DRIVE . -~~MANUAL~~-
3. Turret traverse
lock Lock
4. Ejection guard . . Forward
5. Gunner Enter station

MAIN GUN STATUS
SAFE light on




INSTALL COAXIAL MACHINEGUN

1. Weapon Clear (page 61)
2. GPS FIRE CONTROL
MODE  ~~MANUAL~~
3. Elevation travel
lock Unlock
4. Main gun Elevate manually
5. Smoke box doors. . Open
6. Quick release
pins Remove
7. Muzzle of barrel . Insert into smoke
box
8. Weapon Align receiver holes
with mount holes
9. Trigger. Meets operating
level roller with no
pressure on trigger
10. Quick release
pins Insert
11. Smoke box doors. . Close
12. Spent case Assure correct
collection box . . mounting

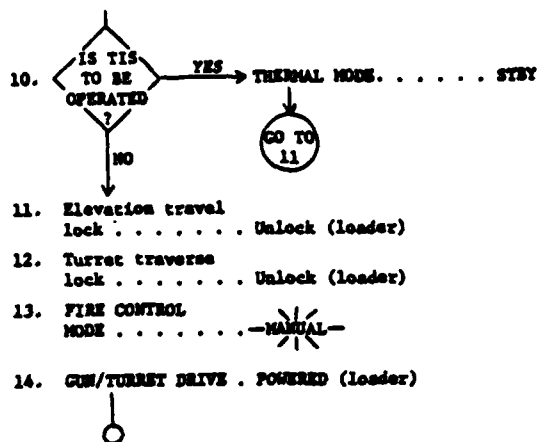


POWER UP STATION

IF LOUD, HIGH-PITCHED SQUEALING NOISE IS
HEARD, OR IF HYDRAULIC PRESSURE DROPS
SUDDENLY TO BELOW 500 PSI, SHUT OFF TUR-
RET POWER AND SHUT DOWN ENGINE

1. Turret power . . . Assure ON
2. Electrical Assure minimum
system gage. . . . 18 volts
3. Engine or
AUX HYD PWR. . . . Running or ON (TC)
4. PANEL LIGHTS
TEST button. . . . Press
5. PANEL LIGHTS . . . Adjust
6. Hydraulic
pressure gage. . . 1500-1700 PSI
7. CCP power. . . .  ~~ON~~
8. CCP TEST button. . Press/check lights
9. CCP cover. Close/latch

All lights on
GPS upper and
lower panels and
TIS panel on



PERFORM GPS FUNCTIONAL CHECK

MAIN GUN MAY MOVE ABRUPTLY DURING THIS ACTIVITY

1. DEFROSTER ~~ON~~
2. DEFROSTER Off
3. GUN/TURRET DRIVE . ~~POWERED~~ (loader)
4. FIRE CONTROL MODE ~~NORMAL~~
5. FIRE CONTROL MODE ~~EMERGENCY~~
6. FIRE CONTROL MODE ~~MANUAL~~
7. GUN SELECT ~~COAR~~ ————— Turret blower operating
8. GUN SELECT ~~TRIGGER SAFE~~

9. GUN SELECT -MAIN-
 10. ARM SELECT. . . . Check lights for all positions
 11. GPS ballistic doors. Open
 12. FLTR/CLEAR/SHTR. . CLEAR ————— See clear view in GPS eyepiece
 13. Magnification lever. 10X to 3X to 10X ————— Eyepiece shows magnification changes
 14. FLTR/CLEAR/SHTR. . FLTR ————— See filter present in GPS eyepiece
 15. FLTR/CLEAR/SHTR. . SHTR ————— Daylight view blocked out of GPS eyepiece
 16. FLTR/CLEAR/SHTR. . CLEAR ————— See clear view in GPS eyepiece
-

PERFORM GPS ADJUSTMENTS

- MAIN GUN MAY MOVE ABRUPTLY DURING THIS ACTIVITY
1. Reticle brightness Adjust
 2. FIRE CONTROL MODE -NORMAL- ————— Stay clear of gun
 3. GPS reticle. . . . On distant target ————— Using power control handle
 4. GPS eyepiece Focus
 5. Reference pointer setting. . Note
 6. Palm switches. . . . Squeeze
- IS THERE MORE THAN 1/2 IN. DRIFT IN 20 SECONDS?
- NO

8. Palm switches. . . . Release

○

YES

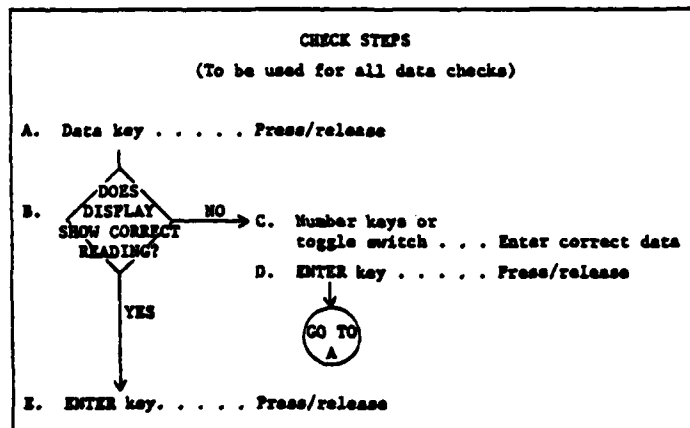
7a. AZ knob. Turn to stop drift

7b. EL knob. Turn to stop drift

GO TO 8

PERFORM COMPUTER DATA CHECK

The box (to the right) contains the common data "CHECK" sequence. When a step in this procedure requires you to "check" a data entry, use this common sequence. Then, go to the next step in the procedure.



1. GUN SELECT ~~MAIN~~

2. CCP power. ~~ON~~

3. AMMO TEMP data . . "Check" (use number keys)

4. BARO PRESS data . . "Check" (use number keys)

If not known, use 29.92

5. AIR TEMP data . . "Check" (use number keys)

If not known, use AMMO TEMP

6. MRS lever. IN

MRS key light on

7. BORESIGHT data . . "Check" (use toggle switch)

8. MRS lever. OUT

9. BORESIGHT data . . "Check" (use number keys)

10. GUN SELECT ~~COAX~~

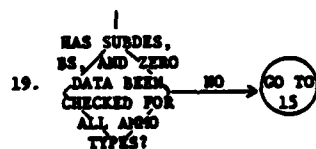
11. AMMO SUNDIS data . "Check" (use number keys)

12. BS range data . . "Check" (use number keys)

13. ZERO data "Check" (use number keys)

14. GUN SELECT ~~MAIN~~

15. AMMO SELECT. . . . SABOT or KEP or HE or HEAT
16. AMMO SUBDES data . "Check" (use number keys)
17. SS range data. . . "Check" (use number keys)
18. ZERO data. . . . "Check" (use number keys or toggle switch)



20. TUBE WEAR data . . "Check" (use number keys)
21. Key cover. Close
22. CCP door Close/latch

PERFORM TIS CHECKOUT

1. THERMAL MODE . . . STBY
2. FLTR/CLEAR/SHTR. . SHTR
3. POLARITY WHITE HOT
4. THERMAL MAGNIFICATION. . . 3X
5. UNIT TEST PATTERN. PCU
6. Fault light. . . . On less than 5 seconds
7. GPS image. See range, possible ☐ possible F
8. UNIT TEST PATTERN. ICU
9. Fault light. . . . On less than 5 seconds
10. GPS image. See test pattern, dark upper right corner, possible ☐
11. UNIT TEST PATTERN. EU
12. Fault light. . . . On less than 5 seconds

13. THERMAL MODE . . . ON
14. GPS image. . . . See corner symbols,
all bottom symbols,
range 8888, possible
☐
15. THERMAL
MAGNIFICATION. . . 10X
16. GPS image. . . . See moving TIS ret-
icle, range 8888
17. THU READY light. . Assure on
18. UNIT TEST
PATTERN. THU
19. Fault light. . . . On less than 5
seconds
20. GPS image. . . . See reticle centered,
vertical bar left of
reticle, range at
bottom, possible ☐
possible F
21. CONTRAST Adjust
22. SENSITIVITY. . . Adjust
23. RETICLE. . . . Adjust brightness .
24. POLARITY BLACK HOT
25. GPS image. . . . See dark bar on
green background

26. POLARITY WHITE HOT
27. GPS image. . . . See light bar on
dark background
28. UNIT TEST
PATTERN. OFF
29. THERMAL
ballistic door . . Open
30. GPS reticle. . . . On 1000 meter target
31. CONTRAST Adjust
32. SENSITIVITY. . . Adjust
33. FOCUS. Adjust
34. Computer Enter 2680 range
35. SYMBOL knob. . . . Clockwise all the
way
36. GPS image. . . . See range symbol
reads 2680, no F
37. SYMBOL knob. . . . Adjust
38. GPS image. . . . Range symbol should
not interfere with
target image
39. THERMAL
MAGNIFICATION. . . 1X

40. THERMAL MODES. . . ON, STBY, or OFF ———— If set to STBY or OFF, set FLTR/CLEAR/SHTR to CLEAR
41. THERMAL ballistic door . . . Close ———— If TIS not used immediately

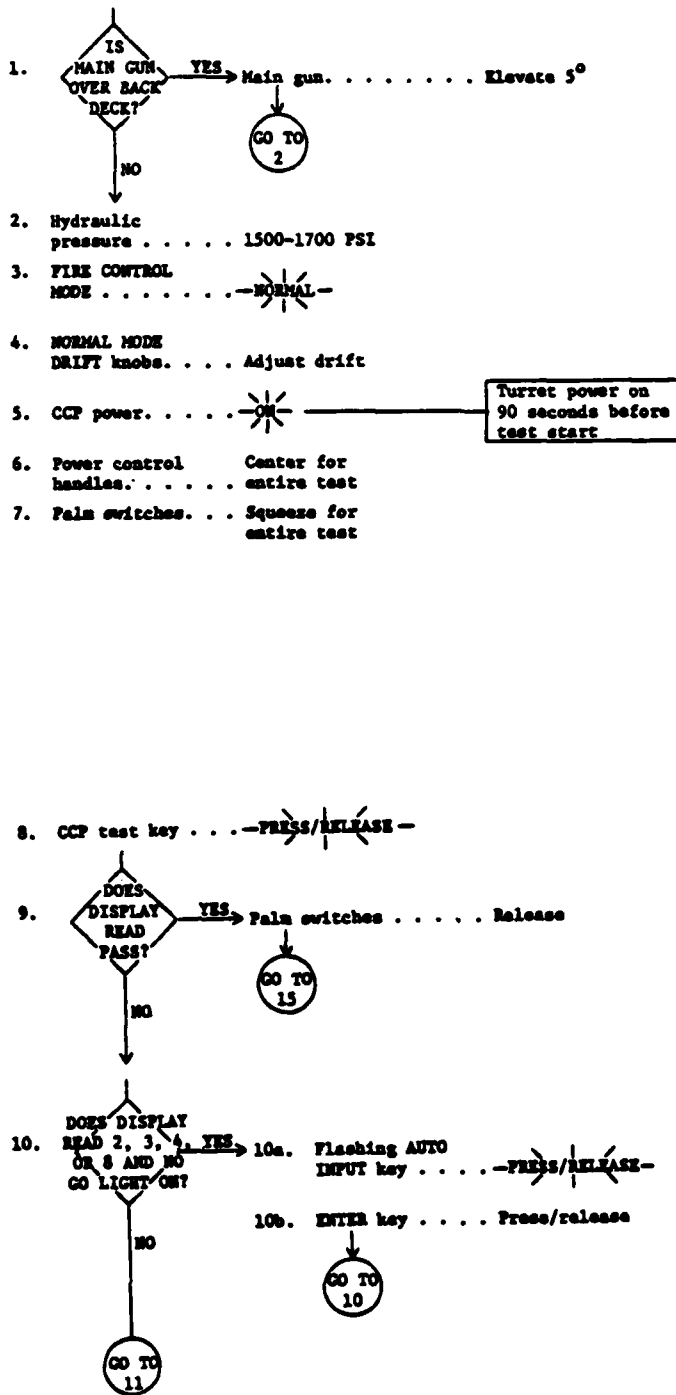


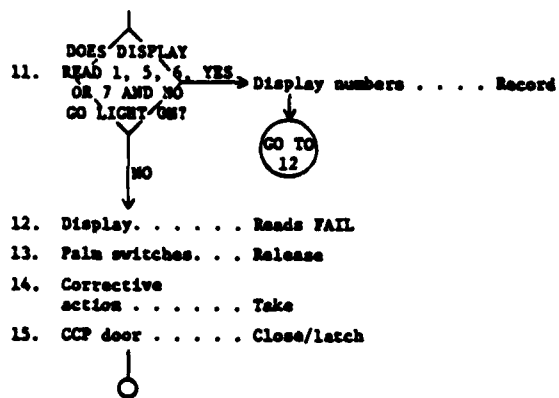
PERFORM GAS ADJUSTMENTS

1. Reticle brightness knob. On ———— If used during night/reduced visibility
2. GAS reticle. On distant target
3. Reticle brightness Adjust
4. GAS focusing ring Adjust to focus reticle
5. GAS filter knob. Adjust
6. RETICLE select SABOT/HEP
7. GAS image. See HEP-T and APFSDS-T legends above reticle
8. RETICLE select HEAT
9. GAS image. See HEAT legend above reticle
10. Reticle brightness knob. OFF if daylight



PERFORM COMPUTER SELF TEST





TEST FIRE CONTROL SYSTEM

1. Lead system
check. Perform (page 22)
2. Firing circuits
check. Perform (page 24)
3. Crosswind sensor
check. Perform (page 28)

PERFORM LEAD SYSTEM CHECK

1. Computer self
test Perform (page 18)
2. GPS day
ballistic door . . Open
3. FIRE CONTROL
MODE -NORMAL-
4. GUN SELECT -MAIN-
5. AMMO SELECT. . . . -HEAT-
6. MAGNIFICATION. . . 10X
7. FLTR/CLEAR/SHTR. . CLEAR
8. Power control
handles. Center
9. Palm switches. . . Squeeze/hold
10. Computer Enter 2000 meter
range
11. GPS image. Observe
12. Power control
handles. Slowly move left/
right/center

13. GPS reticle. . . . Follows power
handles
14. Power control
handles. Rotate in one direc-
tion, then quickly
center
15. Palm switches. . . Release
16. GPS day
ballistic door . . Close

Gunner feel turret
motion

PERFORM FIRING CIRCUITS CHECK

BE SURE ALL WEAPONS ARE CLEAR

1. GUN/TURRET DRIVE .-~~MANUAL~~- (loader)
2. Main gun tube/
turret/breac'h. . . Clear
3. Breach block . . . Close (loader)
4. Tester Between gun tube and
breach block
5. Ejection guard . . Rear (loader) ————— **ARMED light on**
6. Turret networks
box circuit
breakers CB19,
CB20, CB29 ON (loader)
7. GUN SELECT-~~MAIN~~-
8. Blasting Machine . Operate ————— **Tester should flash**
9. Manual elevation
crank handle
palm switch. . . . Squeeze
10. Manual elevation
crank handle
trigger. Press repeatedly ————— **Tester should flash
each time trigger
is pressed**
11. Gun tube/
turret/breac'h. . . Clear
**GUN AND/OR TURRET MAY MOVE
ABRUPTLY DURING FOLLOWING STEPS**
12. GUN/TURRET DRIVE .-~~POWERED~~- (loader)
13. FIRE CONTROL
MODE-~~NORMAL~~-
14. Palm switches. . . Squeeze
15. Left trigger . . . Squeeze/release ————— **Tester should flash**
16. Right trigger. . . Squeeze/release ————— **Tester should flash**
17. Palm switches. . . Release
18. Turret traverse
lock Lock (loader)
19. Both palm
switches Squeeze
20. Power control
handles. Rotate left
21. Left trigger . . . Squeeze/release ————— **Tester should
not flash**

22. Right trigger. . . Squeeze/release — Tester should not flash
23. Power control handles. Rotate right
24. Left trigger . . . Squeeze/release — Tester should not flash
25. Right trigger. . . Squeeze/release — Tester should not flash
26. Both palm switches Release
27. Turret traverse lock Unlock (loader)
28. Elevation travel lock Lock
29. Power control handles. Pull back trying to elevate weapons
30. Both palm switches Squeeze
31. Left trigger . . . Squeeze/release — Tester should not flash
32. Right trigger. . . Squeeze/release — Tester should not flash
33. Both palm switches Release
34. Elevation travel lock Unlock

35. GUN SELECT —~~TRIGGER SAFE~~—

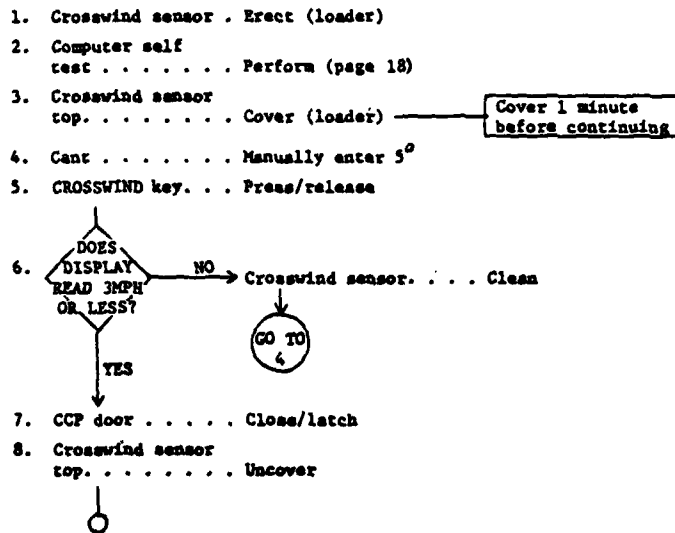
36. Both palm switches Squeeze
37. Left trigger . . . Squeeze/release — Tester should not flash
38. Right trigger. . . Squeeze/release — Tester should not flash
39. Both palm switches Release

40. GUN SELECT —~~MAIN~~—

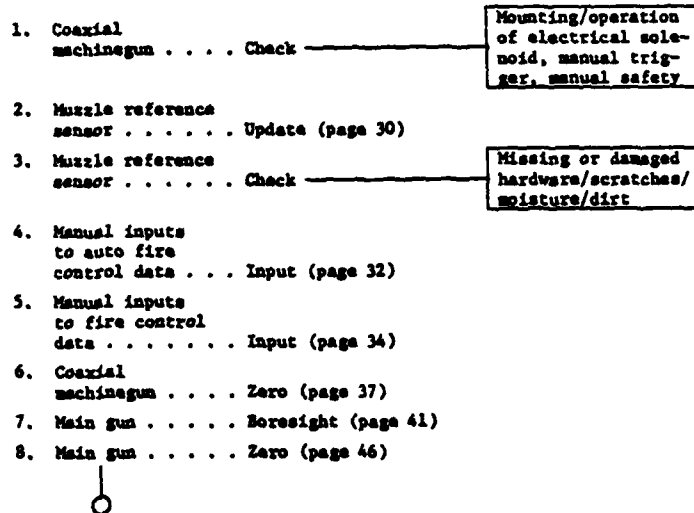
41. GUN/TURRET DRIVE . —~~MANUAL~~— (loader)

42. Both palm switches Squeeze
43. Left trigger . . . Squeeze/release — Tester should flash
44. Right trigger. . . Squeeze/release — Tester should flash
45. Both palm switches Release
46. Tester Remove/stow
47. Ejection guard . . Forward — MAIN GUN STATUS SAFE light on

PERFORM CROSSWIND SENSOR CHECK

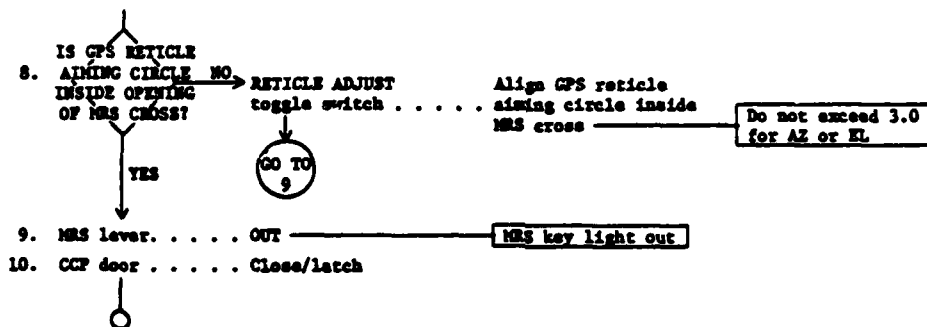


PREPARE TO FIRE CHECKS

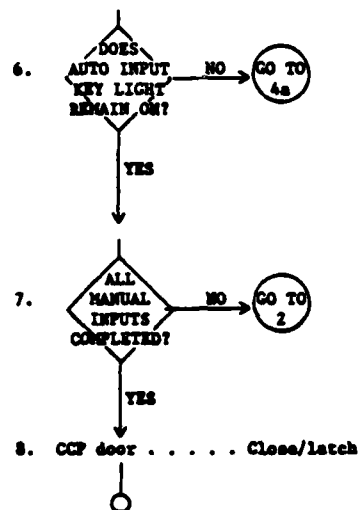
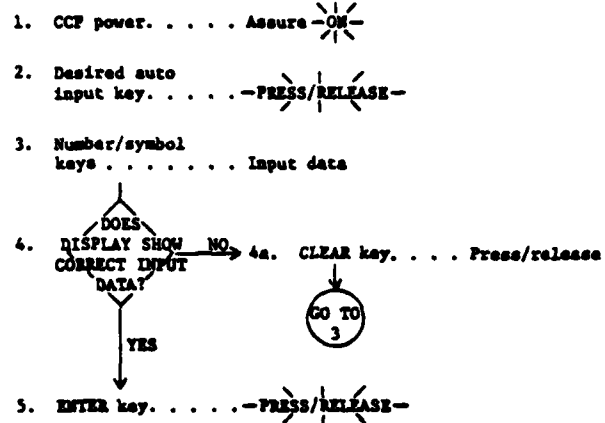


UPDATE MUZZLE REFERENCE SENSOR

1. GPS day
ballistic door . . . Open
2. FIRE CONTROL
MODE -NORMAL-
3. CCF power. -ON-
4. MAGNIFICATION
lever. 10X
5. MRS lever. IN ————— MRS key lit
6. Power control
handle palm
switches Squeeze ————— Gun will move to
0 elevation
7. Power control
handle palm
switches Release



MANUAL INPUTS TO AUTOMATIC FIRE CONTROL DATA



MANUAL INPUTS TO FIRE CONTROL DATA

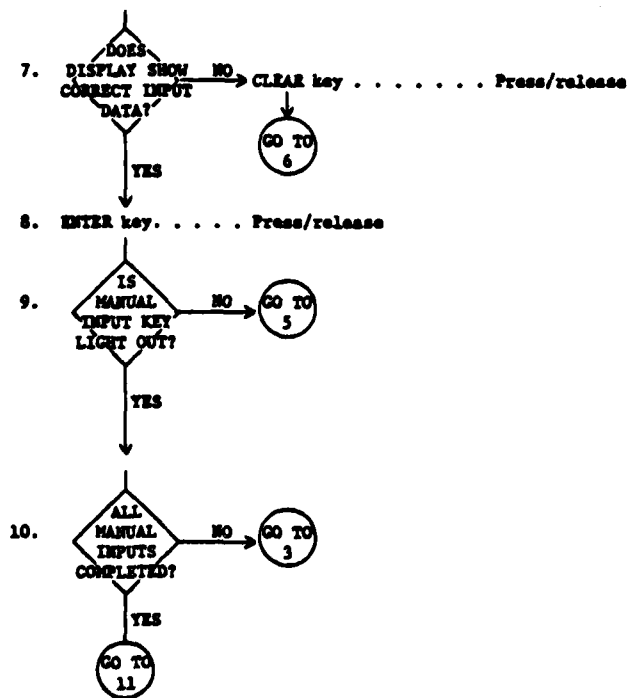
1. CCP power. Assure ~~ON~~
2. Key cover. Open
3. GUN SELECT ~~MAIN~~ or ~~COAX~~
4.

IS GUN
SELECT
SWITCH ON
MAIN?

YES → AMMO SELECT Set to ammo type

GO TO 5

NO →
5. Desired manual input key. ~~PRESS/RELEASE~~
6. Number keys. Input data



11. Key cover. Close
12. CCP door Close/latch



ZERO COAXIAL MACHINEGUN

Prepare to Zero

1. Tank Level
2. Target 800 meters
3. Weapon Install
4. Gunner's station . Power up
5. Coax Load ————— 50 rounds
6. Day ballistic
door Open
7. GUN/TURRET DRIVE . POWERED
8. GPS GUN SELECT . . -~~COAX~~-
9. Turret blower. . . Assure on
10. GPS FIRE
CONTROL MODE . . . -~~NORMAL~~-
11. GPS MAGNIFICA-
TION lever 10X

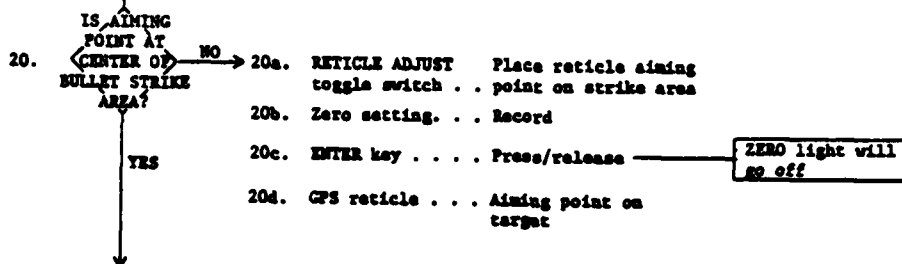
Fire for Zero

12. Main/exterior
gun. Clear/aim downrange

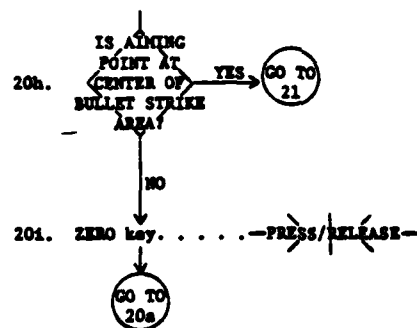
13. GPS reticle. . . . Aiming point on target
14. Target Lase/input 800 meters
15. Weapon Fire ————— 20-25 rounds
16. Lay of gun/reticle. Do not change
17. Power control handles. Release

18. CCP power. ~~ON~~

19. ZERO key ~~PRESS/RELEASE~~



- 20e. Lay of gun/reticle. Do not change
- 20f. Weapon. Fire ————— 20-25 rounds
- 20g. Power control handles Release



21. Zero setting . . . Record
22. ENTER key. Press/release ————— ZERO light will go off
23. CCP power. OFF

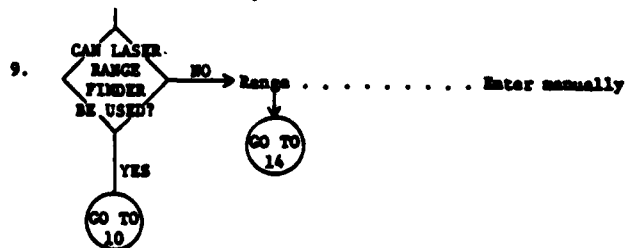
24. CCP door Close/latch
25. Weapon Clear (page 61)



BORESIGHT THE MAIN GUN

Prepare to Boresight

1. Tank Level
2. Target 1200 meters
3. Gun. Front of tank
4. Hydraulic pressure gage. . . 1500-1700 PSI
5. GUN SELECT ~~MAIN~~
6. MAGNIFICATION lever. 10X
7. FLT/CLEAR/SHTR . . CLEAR
8. Day ballistic door Open



10. FIRE CONTROL
MODE ~~EMERGENCY~~

11. GPS reticle. . . . On target center

12. Target Laser

13. FIRE CONTROL
MODE ~~MANUAL~~

14. Muzzle plug. . . . Remove/stow

15. Pye-Watson Insert

Then do not touch
gun or device

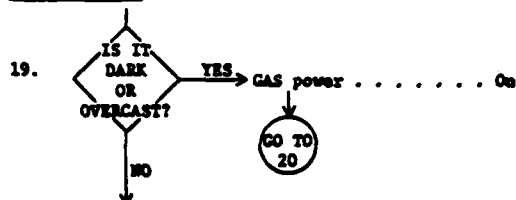
16. Pye-Watson
aiming dot Upper left target
corner

Use manual con-
trols/G pattern/no
overshoot - return

17. Pye-Watson Rotate 180°

18. Pye-Watson
aiming dot Assure upper left
target corner

Boresight GAS



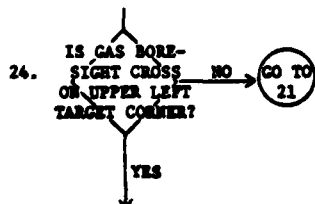
20. Reticle switch . . SABOT/HEP

21. GAS boresight
cross. Upper left target
corner

Use AZ and EL
knobs

22. AZ knob. Hold/turn scale 0 to
index

23. EL knob. Hold/turn scale 0 to
index



Boresight GPS

25. FIRE CONTROL
MODE ~~EMERGENCY~~

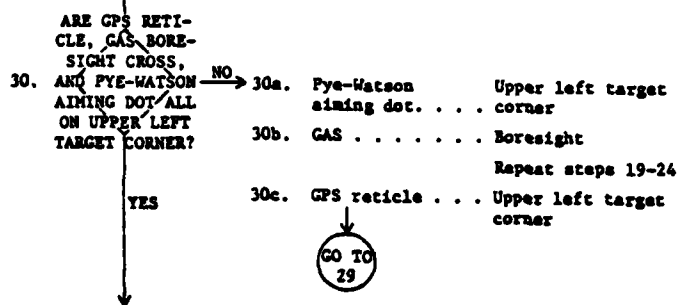
26. CCF power. ~~ON~~


27. BORESIGHT key. . . Press/release

28. GPS reticle
circle Upper left target
corner

Use toggle switch

29. GPS, GAS,
Pye-Watson Observe view



31. AZ/EL values . . . Record
32. ENTER key. . . . Press/release
33. Pye-Watson Remove/stow
34. FIRE CONTROL
MODE -NORMAL-
35. MRS lever. . . . 
36. BORESIGHT key. . . Press/release

37. Power control Squeeze until gun at
palm switches. . . 0° elevation 5 seconds
38. RETICLE ADJUST GPS reticle circle
toggle switch. . . in MRS reticle
39. AZ/EL values . . . Record
40. MRS lever. . . . OUT
41. CCF door : Close/latch



ZERO THE MAIN GUN

Prepare for Zero

1. Gun. Boresight (page 41)
2. Crosswind sensor . Erect
3. CCP power. ~~ON~~
4. AMMO TEMP. Enter data
5. BARO PRESS Enter data
6. AIR TEMP Enter data
7. TUBE WEAR. Enter data
8. MAGNIFICATION
lever. 10X
9. Day ballistic
door Open
10. Zero target. Select
11. Gun. Front of tank
12. GUN SELECT ~~MAIN~~
13. THERMAL MODE STBY
14. FLT/CLEAR/SHTR CLEAR

Fire for Zero

15. Key cover. Open
16. AMMO SELECT. ~~SELECT~~ ————— HEP/APERS/HEAT/
SABOT in order
17. FIRE CONTROL
MODE ~~EMERGENCY~~
18. AMMO SUBDES key. Press/release
19.

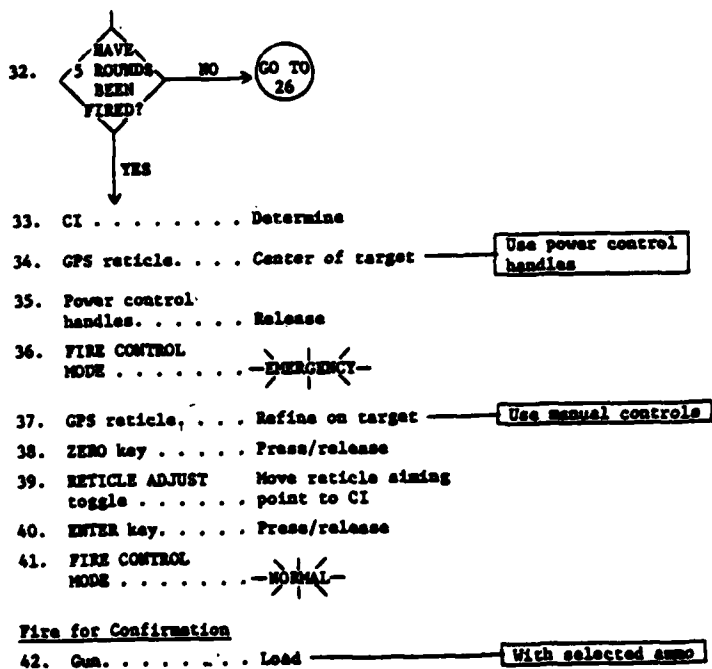
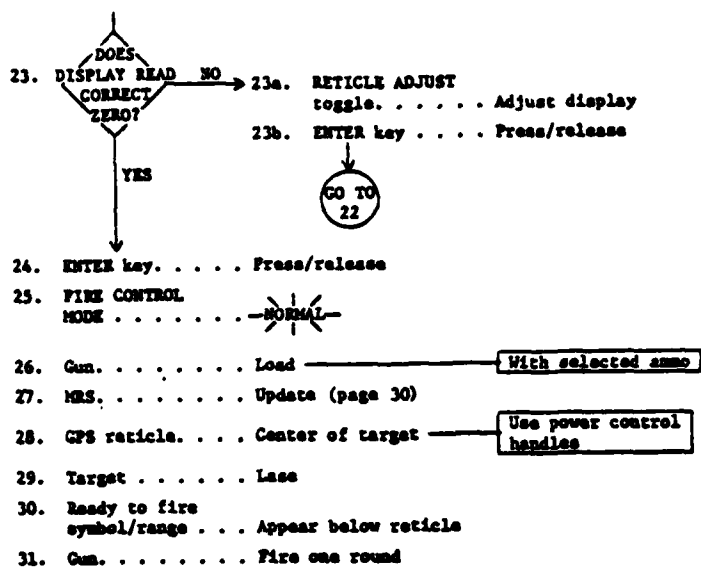
DOES
DISPLAY READ
CORRECT AMMO
SUBDES?

YES
↓

NO
→

19a. Number key. Input SUBDES
19b. ENTER key Press/release

GO TO
18
20. ENTER key. Press/release
21. Turret drift Milled out
22. ZERO key Press/release



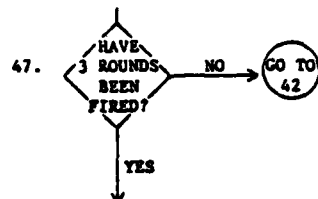
43. MRS. Update (page 30)

44. GPS reticle. . . . Center of target

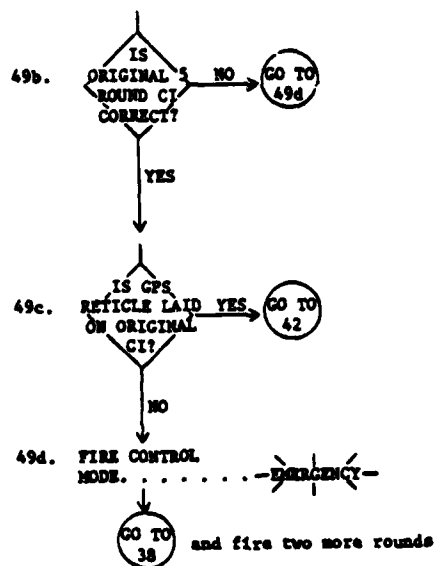
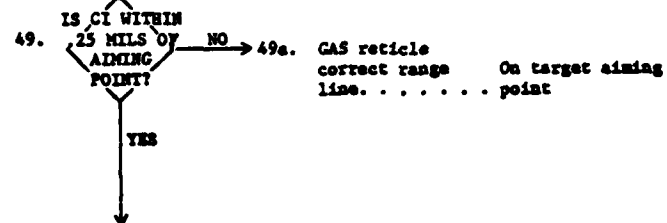
Use power control handles

45. Ready to fire
symbol/range Appear below reticle

46. Gun. Fire one round

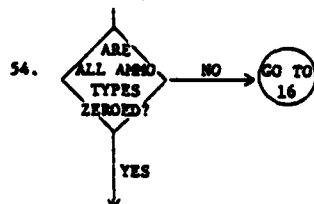


48. CI Determine



50. FIRE CONTROL MODE ~~EMERGENCY~~

51. ZERO key Press/release
52. AZ/EL values Record
53. ENTER key. Press/release



55. Key cover. Close
56. CCF door Close/latch

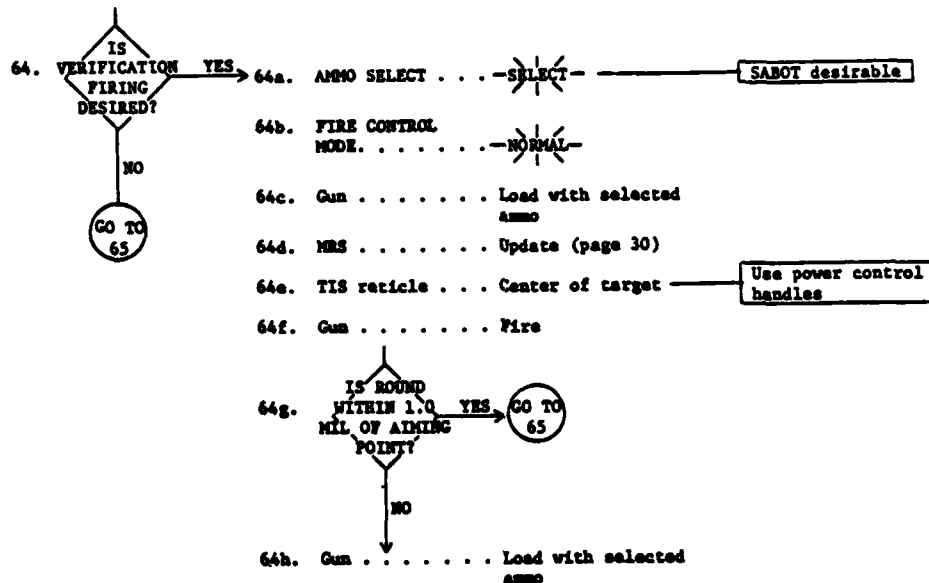
Zero TIS

57. TRU READY light. . . On
58. THERMAL MODE On
59. GPS reticle. Upper left target corner
60. FLT/CLEAR/SHTR . . SHTR
61. THERMAL ballistic door . . Open
62. THERMAL MAGNIFI-CATION lever 10X

Use power control handles

63. TIS reticle. Upper left target corner

Use AZ and EL knobs

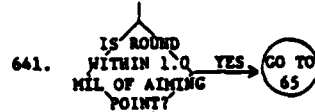


64i. MRS Update

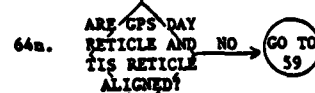
64j. TIS reticle . . . Center of target

Use power control handles

64k. Gun Fire



64m. FLT/CLEAR/SHTR. . CLEAR



64o. ORGANIZATIONAL
MAINTENANCE . . . CONTACT

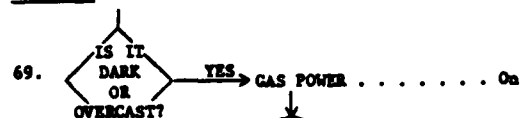
65. AZ and EL values . Record

66. THERMAL MODE . . . OFF

67. FLT/CLEAR/SHTR . . CLEAR

68. THERMAL
ballistic door . . Close

Zero GAS



70. RETICLE select . . SABOT/HEP

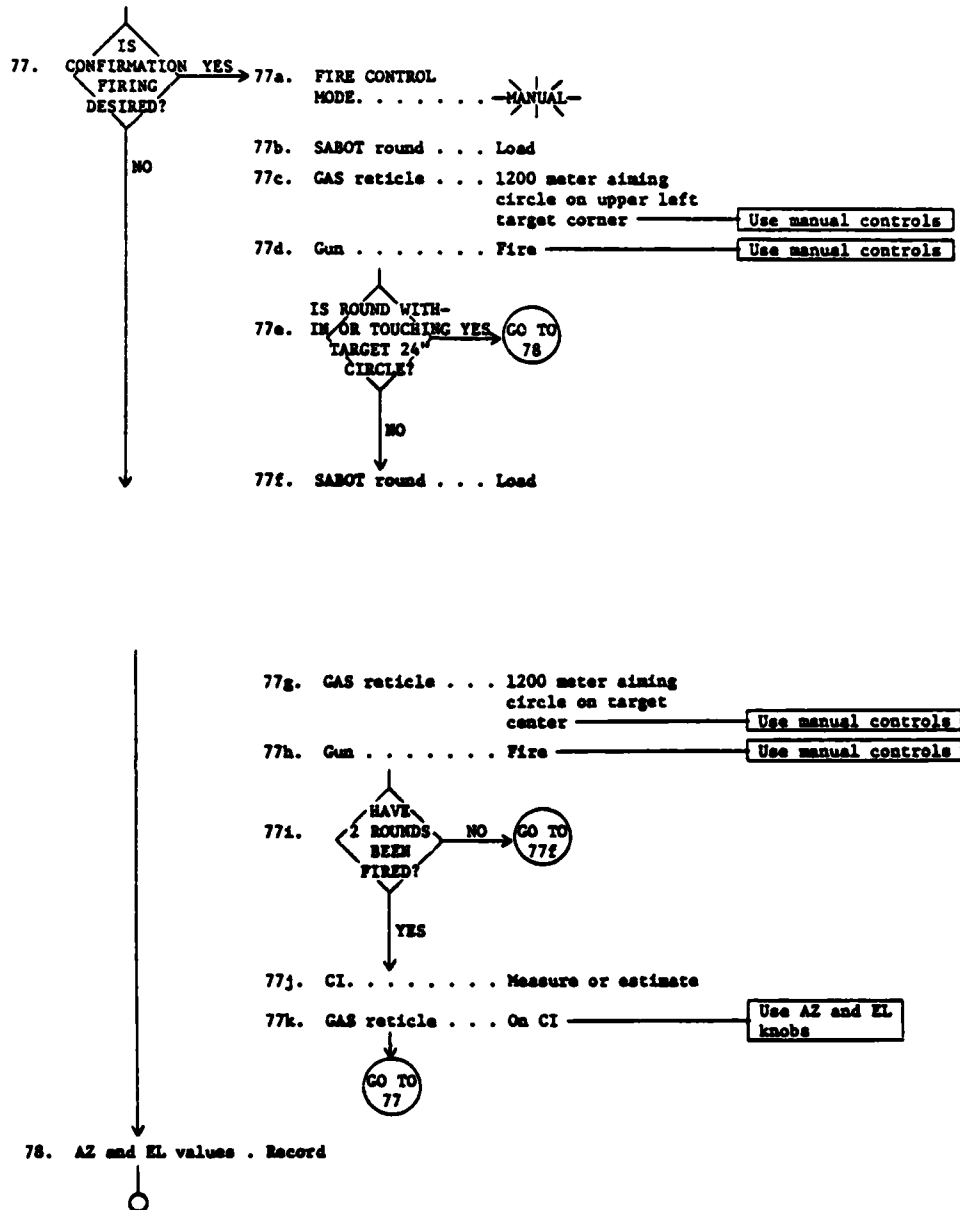
71. AMMO SELECT. ~~SABOT~~

72. FIRE CONTROL
MODE ~~NORMAL~~

73. GPS reticle. Upper left target
corner

Range 1200 meters/
use power control
handles

74. Power control handles. Release
75. GPS reticle. . . . Refine on target — Use manual controls
76. GAS reticle. . . . 1200 meter aiming circle on upper left target corner — Use AZ and EL knobs



SECURE STATION

1. Coaxial
Machinegun Remove (page 59)
2. Station. Power down (page 60)
3. Gunner Exit tank



REMOVE COAXIAL MACHINEGUN

1. Main gun Clear (loader)
2. Weapon Clear (page 61)
3. Main gun Elevate
4. FIRE CONTROL
MODE ~~MANUAL~~
5. Smoke box doors. . Open
6. Quick release
pins Remove
7. Weapon Slide to rear
8. Weapon Lift until barrel is
out of smoke box
9. Quick release
pins Insert
10. Smoke box doors. . Close

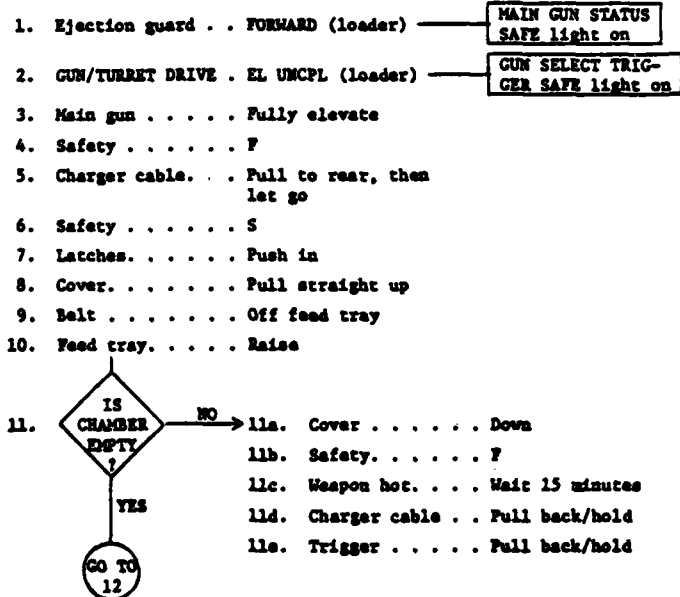


POWER DOWN STATION

1. CCP door Close/latch
2. THERMAL MODE OFF
3. GUN SELECT TRIGGER SAFE
4. Laser RANGE. SAFE
5. GPS ballistic doors. Close
6. GAS POWER. OFF
7. Chestrest. Stowed position
8. Elevation travel lock Lock
9. Turret Traverse so driver can exit
10. Turret traverse lock Lock (loader)
11. CVC helmet Remove/disconnect
12. Downlight. OFF



CLEAR COAXIAL MACHINEGUN



- 11f. Charger cable . . Slowly forward until stops, then let go
- 11g. Trigger Release
- 11h. Charger cable . . Pull back
- 11i. Bullet. Should drop



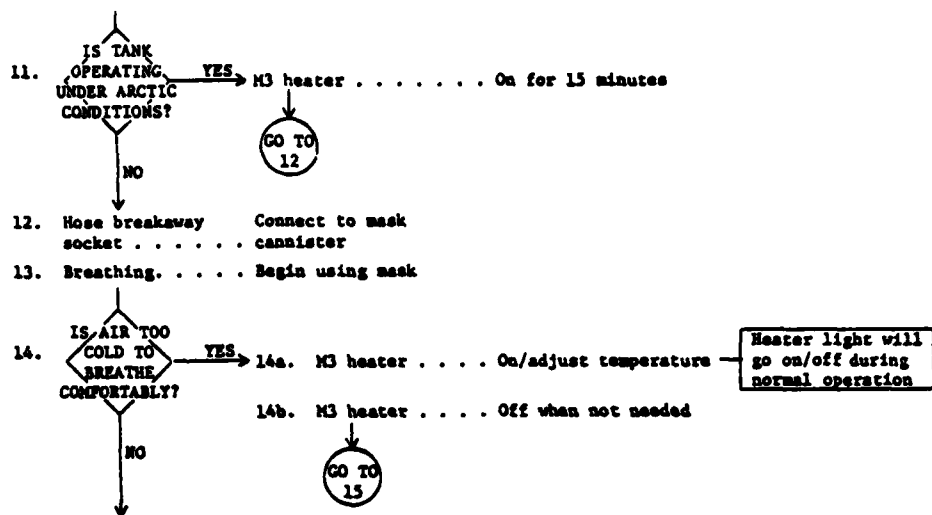
- 12. Cover. Down
- 13. Safety F
- 14. Charger cable. . . Pull back/hold
- 15. Trigger. Pull back/hold
- 16. Charger cable. . . Slowly forward until stops, then let go
- 17. Trigger. Release
- 18. Safety S



OPERATE/SECURE GAS PARTICULATE FILTER

Operate

- 1. VEHICLE MASTER POWER. Assure ON
- 2. Station. Power up
- 3. Turret Power up
- 4. GAS PARTICULATE FILTER ON (driver)
- 5. Mask On
- 6. Mask Clear and seal
- 7. Mike lead. Disconnect from connector
- 8. Mask mike lead . . Hook up to connector
- 9. Spring clip. . . . Remove from intake opening (loader)
- 10. Hose breakaway socket Remove from mount



Secure

15. Hose breakaway socket Disconnect from mask cannister

16. Hose breakaway socket Connect to mount
17. Mask mike lead Disconnect from connector
18. Mike lead. Connect to connector
19. Mask Off/stow
20. GAS PARTIC FILTER OFF (driver)
21. Spring clip. Install (loader)



BEFORE OPERATIONS PMCS

Gunner's Station

1. AUX HYD PWR. . . . OFF (TC panel) ————— Engine off/turret power on
2. Power control handle Elevate/depress main gun slowly
3. Hydraulic pressure gage. . . . Pressure should drop rapidly after reaching 700-750 PSI ————— Large hydraulic leak could be present if high-pitched, squealing noise heard or sudden pressure drop to 500 PSI
4. AUX HYD PWR. . . . ON (TC panel) ————— Engine off/turret power on
5. Auxiliary hydraulic pump . . Listen for operation ————— Pump will not operate until hydraulic pressure drops below 1150 PSI
6. Hydraulic pressure gage. . . . Observe ————— Pump should shut off at 1550-1650 PSI
7. Power gun/turret control . . Check operation

8. Turret traverse lock Unlock (loader)
9. Elevation lock Unlock
10. Manual elevation crank handle Elevate/depress main gun
11. Manual traverse crank handle Traverse turret left/right
12. Manual traverse palm lever Depress
13. Power control handles. Move ————— Power controls should have no effect
14. Manual traverse palm lever Release
15. AZ filter servo button In place ————— If popped out, push button in once
16. EL filter servo button In place (driver) ————— If popped out, push button in once (driver)
17. Turret Traverse
18. Gun. Elevate
19. AZ/EL buttons. . . . In place
20. Hydraulic lines. . . . Check for leaks

21. Hydraulic pressure Check

Gage should read 1550-1650 PSI with engine running or 1150-1650 PSI with AUX HYD pump operating

22. GAS PARTIC FILTER On (driver)

23. Spring clip. Remove (loader)

24. Filtered air hose Remove from connector

25. Airflow. Should be felt

26. Heater On

Heater lamp lights and heater are working

27. Heater Off

28. Mask Check operation

29. Mike Check operation



AFTER OPERATIONS PMCS

Gunner's Station

1. Power gun/turret control . . Check operation

2. Turret traverse lock Unlock (loader)

3. Elevation lock Unlock

4. Manual elevation crank handle Elevate/depress main gun

5. Manual traverse crank handle Traverse turret left/right

6. Manual traverse palm lever Depress

7. Power control handles. Move

Power controls should have no effect

8. Manual traverse palm lever Release

9. AZ filter servo button In place

If popped out, push button in once

10. EL filter servo button In place (driver)

If popped out, push button in once

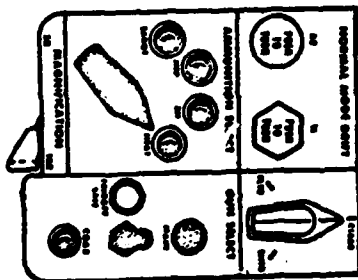
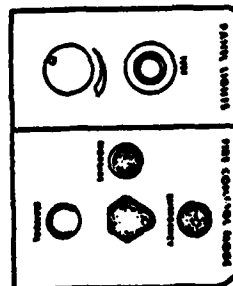
11. Turret Traverse
12. Gun. Elevate
13. AZ/EL buttons. . . In place
14. Hydraulic lines. . Check for leaks

15. Hydraulic pressure Check

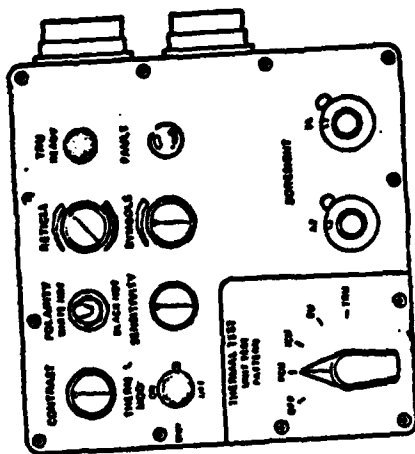


Cage should read
1350-1650 PSI with
engine running or
1150-1650 PSI with
AUX HYD pump oper-
ating

GUNNER'S PRIMARY SIGHT PANEL (UPPER)

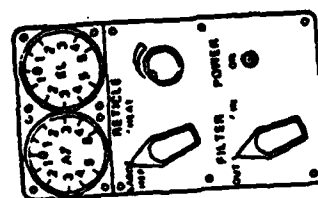


GUNNER'S PRIMARY SIGHT PANELS (LOWER)

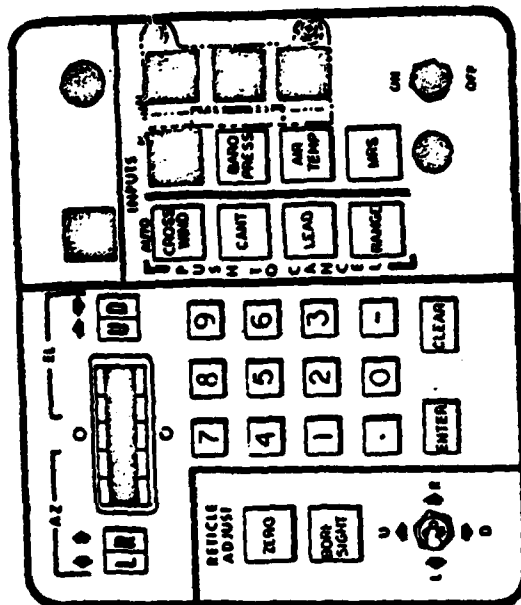


69

GUNNER'S THERMAL IMAGING SIGHT PANEL



GUNNER'S AUXILIARY SIGHT PANEL

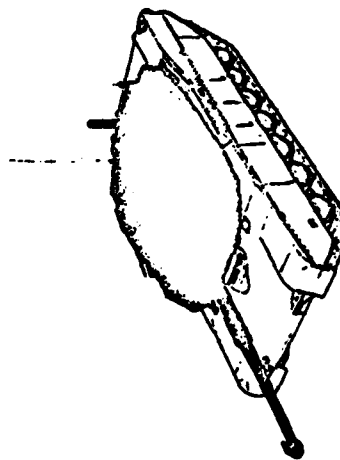


COMPUTER CONTROL PANEL

DRIVER

PROCEDURE GUIDES

M1 TANK



JULY 1981

PREPARED BY THE U.S. ARMY RESEARCH INSTITUTE
FOR THE
BEHAVIORAL AND SOCIAL SCIENCES

GENERAL INFORMATION

This booklet contains M1 driver procedure guides. Each guide is for a single pre-operation, post-operation, or during operation activity. Each guide is matched to TM-9-2350-255-10 (Operator's Manual for Tank, Combat, Full-Tracked, 105 MM, M1).

PURPOSE OF PROCEDURE GUIDES

The guides in this booklet will not take the place of the M1 TM or M1 training materials. The guides will aid you in remembering long or difficult sets of procedures. In short, the guides will help to "jog your memory."

USE OF THIS BOOKLET

The Table of Contents (on the next page) lists the procedure guides in this booklet. Each guide gives you a step-by-step outline for completing an activity. The following will help you to better use each guide.

1. Some steps within a procedure guide are followed by a page number. On that page you will find a detailed breakdown of the step.



2. Some of the procedure guides include a question(s). Each question is stated inside a diamond shape. Your "yes" or "no" to the question will show you which path to follow.



3. Some steps within a procedure guide are followed by a box. In the box you will find more information on the step or a caution/warning.



4. Certain steps within a procedure guide require that a knob or switch be turned to a certain position. In some cases, that position might be written like the symbol to the left. The symbol means that a light should also come on.

5. Pictures of selected panels/equipment can be found at the end of this booklet.

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PREPARE STATION

1. Driver Enter station (page 2)
2. Hull systems Power up (page 3)
3. Downlight. Adjust
4. Turret seal. Check
5. Intercom Adjust
6. Seat Adjust
7. Periscopes Adjust
8. Hatch. Adjust
9. Steer-throttle control. Adjust
10. Drain valves Operate/close
11. Engine Start (page 6)
12. After start checks Perform (page 9)



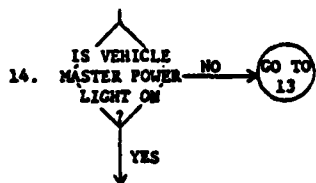
ENTER STATION

1. Loader's hatch . . Unlock/open
2. GUN/TURRET DRIVE . -MANUAL-

3. Turret traverse
 Lock Locked
4. Loader's toe Against ammo
 guard storage box
5. Headrest Up
6. Seat back. Down
7. Driver Enter station
8. Parking brake. . . Set
9. CREW FIRE extin-
 guisher handle . . Seated
10. ENGINE FIRE extin-
 guisher handle . . Seated



POWER UP HULL SYSTEMS

1. PERSONNEL HEATER . OFF
2. NIGHT PERISCOPE. . OFF
3. GAS PARTIC
 FILTER OFF
4. BILGE PUMP OFF
5. SMOKE GENERATOR. . OFF
6. LIGHTS OFF
7. HI BEAM. OFF
8. TACTICAL IDLE. . . OFF
9. TANK SELECTOR. . . REAR
10. FIRE EXTINGUISHER
 2nd SHOT switch
 cover. Close
11. All gages. Lowest position
12. Domelight. OFF
13. VEHICLE MASTER
 POWER switch . . . Hold ON



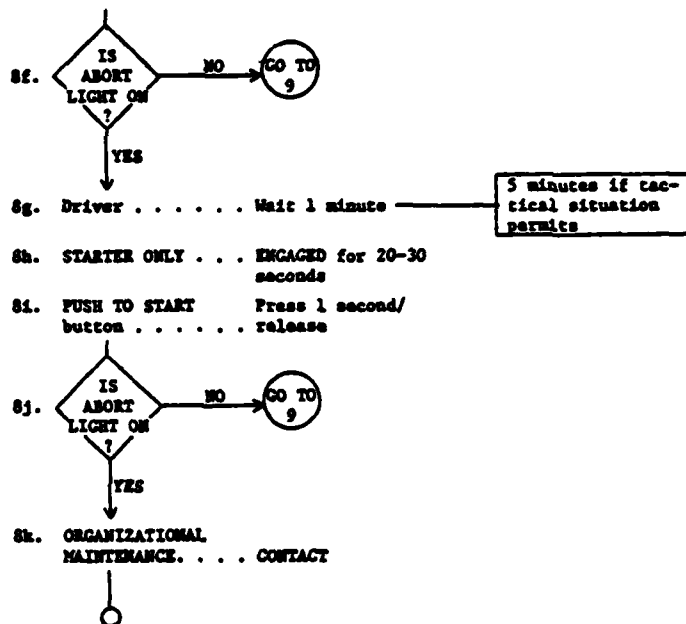
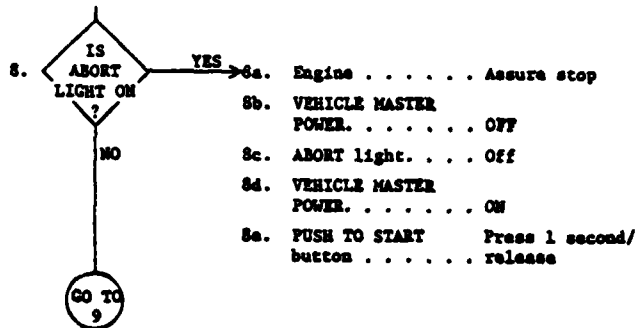
15. VEHICLE MASTER POWER switch . . . Release
16. Hull networks box circuit breakers ON
17. Hull networks box cover. Close
18. Hull power distribution box circuit breakers . ON
19. Hull distribution box cover . . Close
20. PERSONNEL HEATER light. Off
21. NIGHT PERISCOPE light. Off
22. GAS PARTIC FILTER light . . . Off
23. BILGE PUMP light . Off

24. SMOKE GENERATOR light. Off
25. HI BEAM light. . . Off
26. FIRE light Off
27. PARKING/SERVICE BRAKES light . . . On
28. PANEL LIGHTS TEST button. . . . Press/hold
29. Alert panel lights Adjust brightness
30. Master instrument panel lights . . . Adjust brightness
31. Electrical system gage. . . . 23-29 volts
32. CABLE DISCONNECTED light . . . Off
33. CIRCUIT BREAKER OPEN light Off
34. Fuel tanks Check fuel levels
35. Parking brake system hydraulic pressure gage. . . Check for bleed off

All master instrument/alert panel lights on

START ENGINE

1. Driver Obtain TC clearance
2. Transmission control Neutral (N)
3. Steer-throttle control Center
4. Parking brake. Set
5. TC TURRET POWER. OFF
6. Radio. Off (loader)
7. PUSH TO START button Press 1 second/
release



9. STARTED light. . . On within 25-60 seconds Remains on 10 seconds
10. Radio. On (loader)
11. After start checks Perform



AFTER START CHECKS

1. TACTICAL IDLE. . . OFF
2. RPM gage 870-950 (after 1 minute - engine operation)
3. TACTICAL IDLE. . . ON
4. RPM gage 1250-1350
5. TACTICAL IDLE. . . OFF
6. RPM gage 870-950
7. ELECTRICAL SYSTEM gage. 27.5-28.5 volts
8. MASTER WARNING light. On
9. PARKING/SERVICE BRAKES lights. . . On
10. ENGINE warning lights Off
11. TRANSMISSION warning lights . . Off
12. FIRE light Off
13. MASTER CAUTION light. Off

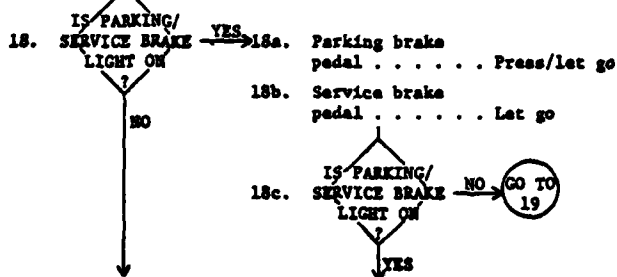
14. Parking brake system hydraulic pressure gage. . . 1200-1600 PSI
15. Driver Announce brake check
16. Service brake pedal. Press/hold

Feels solid, not touching hull

BRAKES CHECK MUST BE COMPLETED WITHIN 2 MINUTES AFTER PRESSING SERVICE BRAKE

PARKING/SERVICE BRAKES LIGHT WILL GO ON IF SERVICE BRAKE HAS BEEN PRESSED FOR MORE THAN 2 MINUTES WITH ENGINE RUNNING

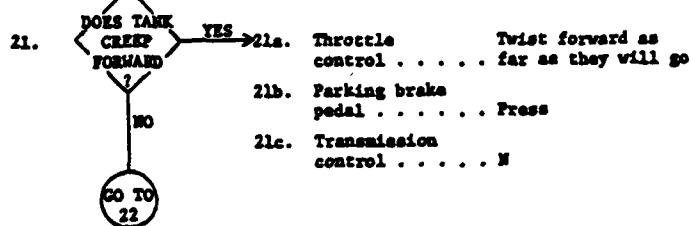
17. PARKING BRAKE RELEASE handle . . Pull/push back



19. Transmission control. D

While holding service brake

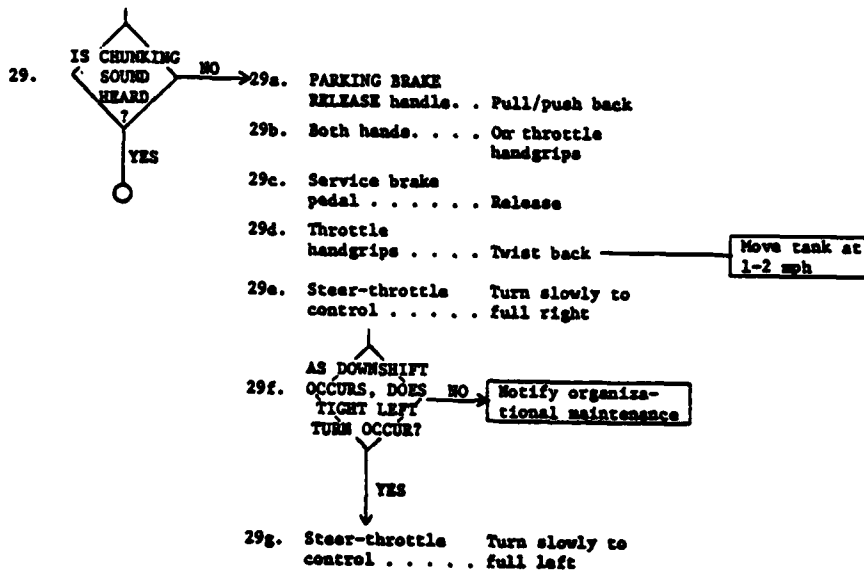
20. Throttle controls Twist slowly until 1450-1550 rpm

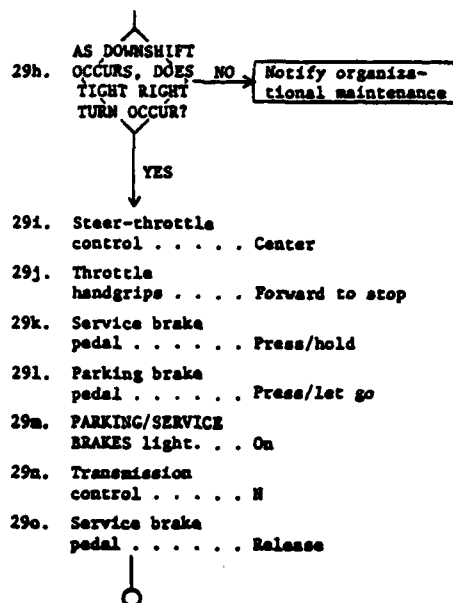


- 21d. Service brake pedal Press/hold
- 21e. Parking and service brake pedals. Let go
- 21f. SHUTOFF switch. . SHUTOFF
- 21g. ORGANIZATIONAL MAINTENANCE . . . CONTACT



- 22. Throttle controls Twist forward as far as they will go
- 23. Transmission control. N
- 24. Parking brake pedal. Press/let go
- 25. Driver Announce brake check finished
- 26. Service brake pedal. Press/hold
- 27. Transmission control. D
- 28. Steer-throttle control. Turn all the way right





SECURE STATION

1. Engine Shut down (page 16)
2. Hull systems Power down (page 18)
3. Hatch. Close
4. Driver Exit tank (page 19)



SHUT DOWN ENGINE

1. Throttle handgrips. Forward (idle)
2. Service brake pedal. Press/hold Stop tank
3. Transmission control. N
4. Hydraulic pressure gage. Steady (1200-1600 PSI)
5. Parking brake pedal. Press/let go
6. Service brake pedal. Release
7. MASTER WARNING light. On
8. PARKING/SERVICE BRAKES light On
9. TACTICAL IDLE. . . . Off
10. BILGE PUMP/light . OFF
11. SMOKE GENERATOR/light. OFF
12. Unused AUXILIARY SYSTEMS. OFF

13. ENGINE WARNING light. Off
14. TRANSMISSION light. Off
15. FIRE light Off
16. MASTER CAUTION light. Off
17. Engine Idle for 2 minutes
18. ENGINE SHUTOFF switch SHUTOFF Engine coast to stop in 30-60 seconds



POWER DOWN HULL SYSTEMS

1. PERSONNEL HEATER . OFF
2. NIGHT PERISCOPE. . OFF
3. GAS PARTIC
FILTER OFF
4. BILGE PUMP OFF
5. SMOKE GENERATOR. . OFF
6. LIGHTS OFF
7. HI BEAM. OFF
8. TACTICAL IDLE. . . OFF
9. TANK SELECTOR. . . REAR
10. Drain valve
handles. Open
11. VEHICLE MASTER Hold OFF 1 second/
POWER. let go ————— When directed by TC
12. MASTER POWER . . . Off
13. MASTER POWER
light. Off ————— 30 seconds after
engine shut down
cycle complete



EXIT TANK

1. Hatch. Close/lock
2. Turret traverse
lock Locked (loader)
3. CVC helmet Remove/disconnect
4. Seat back. Lower
5. Headrest Raise
6. Loader's toe Against ammo
guard. storage box
7. Driver Exit station
8. Driver Exit tank
9. Loader's hatch . . Close/lock



OPERATE/SECURE GAS PARTICULATE FILTER

Operate:

1. VEHICLE MASTER POWER Assure ON
2. Station Power up
3. GAS PARTIC FILTER ON
4. Mask On
5. Mask Clear and seal
6. Mike lead Disconnect from connector
7. Mask mike lead Hook up to connector
8. Spring clip Remove from intake opening (loader)
9. Hose breakaway socket Remove from mount
10. IS TANK OPERATING UNDER ARCTIC CONDITIONS?
 - YES → M3 heater On for 15 minutes
 - NO → GO TO 11

11. Hose breakaway socket Connect to mask cannister
12. Breathing Begin using mask
13. IS AIR TOO COLD TO BREATHE COMFORTABLY?
 - YES → 13a. M3 heater On/adjust temperature
 - 13b. M3 heater Off when not needed
 - NO → GO TO 14

Heater light will go on/off for normal operation

Secure

14. Hose breakaway socket Disconnect from mask cannister
15. Hose breakaway socket Connect to mount
16. Mask mike lead Disconnect from connector
17. Mike lead Connect to connector
18. Mask Off/stow

19. GAS PARTIC
FILTER OFF
20. Spring clip. Install (loader)



BEFORE OPERATIONS PMCS

Vehicle Exterior

1. Vehicle. Check for leaks
2. Vehicle. Check for tampering
3. Vehicle. Check for damage
4. Vehicle. Check for missing
parts
5. Vehicle. Check for puddles of
engine/transmission
oil
6. Track tension. . . Adjusting link not
more than 1/8 inch
from lock nut
7. Hull access. . . . In place/secure
8. Rear grille
doors. Closed/bolts tight
9. Muzzle reference
sensor Check for cracks/
damage
10. Muzzle reference
sensor Check for loose fit
11. Sensor lenses. . . Check for gouges/
scratches
12. Sensor lenses. . . Check for tightness

Hull

- 13. Fuel tank filler covers In place/secure
- 14. Filler cover brackets Check for cracks
- 15. Filler cover brackets Not missing
- 16. Battery condition indicators Not missing
- 17. Sponson air intake grille. Clear of dirt/leaves/other material
- 18. Precleaner top and seal assembly Check for cracks/dents
- 19. Precleaner top Clear of leaves/twigs/dirt/other debris

- 20. Transmission oil . Check for leaks

Can operate equipment with minor leaks (Class I or II)

- 21. Transmission oil level. Correct level

- 22. Engine oil Check for leaks

Can operate equipment with minor leaks (Class I or II)

- 23. Engine oil level . Correct level
- 24. Fire extinguisher sensor lenses. . . Clean
- 25. Fire extinguisher sensor lenses. . . Not missing
- 26. Fire extinguisher sensor lenses. . . Check for damage

Driver's Station

- 27. Fire bottle pressure gage. Pressure above minimum for ambient temperature
- 28. Bottle Secure in mount
- 29. Sensor lenses. . . Clean
- 30. Engine/vehicle master power . . . Off
- 31. Parking brake. . . Apply repeatedly
- 32. Hydraulic pressure Decrease slowly to 600-800 PSI, then drop rapidly to zero
- 33. Engine Start
- 34. Lights/instruments. Normal during start/run
- 35. Left rear grille door. Check for scavenger blower air (crew-member)

36. Instruments. . . . Monitor during operation
 37. Master panel lights switch. . . . Check through com-plate operation — Have crewmember assist
 38. HI BEAM switch . . . Check operation
 39. Dowlights Check operation (crewmember)
 40. Lens Check for breaks/cracks
 41. Cables Check for damage
 42. Driver's hatch . . Check operation/locking
 43. Periscopes Clean/clear
 44. Hatch seal Check for rips/separation
 45. Open/closed hatch lever. . . . Check operation
 46. Upper seat back lever. Check operation
 47. Lumbar support knob Check operation
 48. Height adjustment Check operation
 49. Headrest Move to up/down positions
-
50. Headrest position lock. Holds headrest secure
 51. Seat cushions. . . Check for rips/tears
 52. GAS PARTIC FILTER ON
 53. Spring clip. . . . Remove (loader)
 54. Filtered air hose Remove
 55. Airflow. Should be felt
 56. Heater On — Heater lamp lights and heater are working
 57. Heater Off
 58. Mask Check operation
 59. Mike Check operation
 60. GAS PARTIC FILTER OFF — After crewmembers have made checkout
-

DURING OPERATIONS PMCS

Vehicle Exterior

1. Track tension. . . Adjusting link not more than 1/8 inch from lock nut
2. Roadwheel/Idler wheel hubs Check for leaks
3. Hubs Touch-test for heat
4. Hub oil level. . . Correct level
5. Hub oil. No water present
6. Rubber plugs . . . In place
7. Arm housings . . . Check for leaks
8. Arms Check for bends/gouges
9. Roadwheels/Idler wheels Not missing/bent/broken
10. Wearplates Not missing/secure
11. Wearplates Check for cracks/gouges
12. Wheel rubber . . . Not more than 50% of rubber chunked/separated
13. Mounting nuts/bolts. Secure
14. Centerguides . . . Check for bends/breaks
15. Shock absorber sight gages. Correct level —————

Indicator ball between middle and top of gage
16. Shock absorbers. . Check for leaks
17. Shock absorber housing. Touch-test
18. Roadwheel arms 2 through 6. Pry up with crowbar —————

If roadwheels cannot be lifted, torsion bar is good
19. Roadwheel arms 1 and 7. Tank not tilted, roadwheel/track on ground
20. Torsion bars . . . Not missing/broken
21. Skirt panels . . . Open (as needed)
22. Shoe assemblies. . Check for missing/bent/broken centerguides
23. Shoe assemblies. . Check for missing nuts
24. End connector wedges In place/tight/properly seated
25. End connector bolts. In place/tight/properly seated

26. Track shoes . . . Not out of line/dead
27. Skirt panels . . . Close all except 2 and 6
28. Lube fittings. . . In place
29. Lube fittings. . . Check for leaks/damage
30. Wheel. Check for cracks/unusual wear
31. Spindle support retaining pin. . . In place/secure
32. Support roller hub cap. Check for cracks/damage/leaks
33. Support roller hub caps Secure
34. Hubs Touch-test for heat
35. Inner/outer sprocket Check for cracks and worn/gouged teeth
36. Sprocket bolts . . In place/secure
37. Sprocket assembly hubs. . . Check for cracks/gouges
38. Mounting bolts . . In place/secure
39. Track retainer . . Check for bands/cracks
40. Track retainer bolts. In place/not damaged

Hull

41. Fuel tank filler covers. . . In place/secure
42. Filler cover brackets Check for cracks
43. Filler cover brackets Not missing

Driver's Station

44. Steer-throttle control. Check for freedom-of-movement
45. Control. Returns to center under spring tension
46. Throttle grips . . Twist rearward/release
47. Grips. Return to idle position under spring tension
48. Steer-throttle control. Check adjustment
49. Service brakes . . Press
50. Parking brake. . . Press
51. Transmission shift selector . . D
52. Engine 1450-1550 rpm

Tank stops without pulling to side

53. Tank Does not move
54. Brakes Release
55. Open/closed
hatch lever. Check operation
56. Upper seat back
lever. Check operation
57. Lumbar support
knob Check operation
58. Height adjust-
ment Check operation
59. Headrest Move to up/down
positions
60. Headrest posi-
tion lock. Holds headrest
secure
61. Seat cushions. Check for rips/tears

AFTER OPERATIONS PMCS

Vehicle Exterior

1. Tank Check for missing
parts
2. Drain valves Open
3. Tank Check for leaks
4. Tank Clean
5. Tarpaulin. In place/secure
6. Track tension. Adjusting link not
more than 1/8 inch
from lock nut
7. Adjusting link
assembly hard-
ware/lube fit-
tings. In place/secure
8. Lock bolt. In place/secure
9. Relief valve No grease leaks
10. Roadwheel/Idler
wheel hubs Check for leaks
11. Hubs Touch-test for heat
12. Hub oil level. Correct level
13. Hub oil. No water present
14. Rubber plugs In place

15. Arm housing. . . . Check for leaks
 16. Arms Check for bends/
gouges
 17. Roadwheels/Idler Not missing/bent/
wheels broken
 18. Wearplates In place/secure
 19. Wearplates Check for cracks/
gouges
 20. Wheel rubber . . . Not more than 50%
of rubber chunked/
separated
 21. Mounting nuts/
bolts. Secure
 22. Center guides. . . Check for bends/
breaks
 23. Shock absorber
sight gages. . . . Correct level ————— Indicator ball
between middle
and top of gage
 24. Shock absorber . . Check for leaks
 25. Shock absorber
housing. Touch-test
 26. Roadwheel arms
2 through 6. . . . Fry up with crowbar ————— If roadwheels
cannot be lifted,
torsion bar
is good
-
27. Roadwheel arms Tank not tilted,
1 and 7. roadwheel/track on
ground
 28. Torsion bars . . . Not missing/broken
 29. Skirt panels . . . Open (as needed)
 30. Shoe assemblies. . Check for missing/
bent/broken center-
guides
 31. Shoe assemblies. . Check for missing
nuts
 32. End connector In place/tight/
wedges properly seated
 33. End connector In place/tight/
bolts. properly seated
 34. Track shoes. . . . Not out of line/dead
 35. Skirt panels . . . Close all except 2
and 6
 36. Lube fittings. . . In place
 37. Lube fittings. . . Check for leaks/
damage
 38. Wheel. Check for cracks/
unusual wear
 39. Spindle support
retaining pin. . . In place/secure
 40. Support roller Check for cracks/
hub cap. damage/leaks

41. Support roller
hub caps Secure
42. Hubs Touch-test for heat
43. Inner/outer
sprocket Check for cracks and
worn/gouged teeth
44. Sprocket bolts In place/secure
45. Sprocket
assembly hubs. Check for cracks/
gouges
46. Mounting bolts In place/secure
47. Track retainer Check for bends/
cracks
48. Track retainer
bolts. In place/not damaged
49. Skirt panels Open
50. Hinges Check for damage
51. Latches. Check for damage
52. Support struts Check for damage .
53. Pins Straight/secure
54. Skirts Check for damage
55. Fenders. Check for damage
56. Mud guards Check for damage
57. Skirt panels Close
58. Hull access
plates In place/secure

59. Rear grille
doors. Closed/bolts tight
60. Muzzle reference
sensor Check for loose fit
61. Sensor lenses. Check for gouges/
scratches
62. Sensor lenses. Check for tightness
63. Sponson air
intake grille. Clear of dirt/
leaves/other
material

Hull

64. Precleaner
top and seal
assembly Check for cracks/
dents
65. Precleaner top Clear of leaves/
twigs/dirt/other
debris

66. Transmission oil Check for leaks

Can operate
equipment with
minor leaks
(Class I or II)

67. Transmission oil
level. Correct level

68. Engine oil Check for leaks

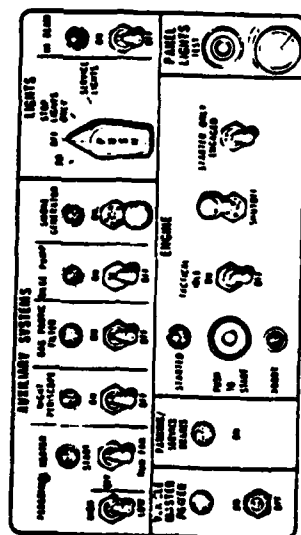
Can operate
equipment with
minor leaks
(Class I or II)

69. Engine oil level . Correct level
70. Fire extinguisher
sensor lenses. . . Clean
71. Fire extinguisher
sensor lenses. . . Not missing
72. Fire extinguisher
sensor lenses. . . Check for damage
73. Engine
hydraulics Inspect
74. Heat exchanger . . Inspect

Driver's Station

75. Master panel Check through com-
lights switch. . . plete operation — Have crewmember
assist
76. HI BEAM switch . . Check operation
77. Domelights Check operation
(crewmember)
78. Lens Check for breaks/
cracks
79. Cables Check for damage
80. Driver's hatch . . Check operation/
locking
81. Periscopes Clean/clear
82. Hatch seal Check for rips/
separation

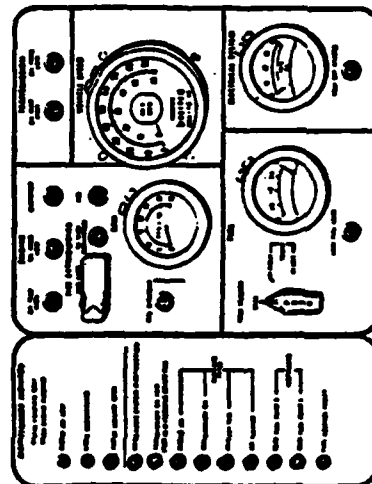
83. Open/closed
hatch lever. . . . Check operation
84. Upper seat back
lever. Check operation
85. Lumbar support
knob Check operation
86. Height adjust-
ment Check operation
87. Headrest Move to up/down
positions
88. Headrest posi- Holds headrest
tion lock. secure
89. Seat cushions. . . Check for rips/tears



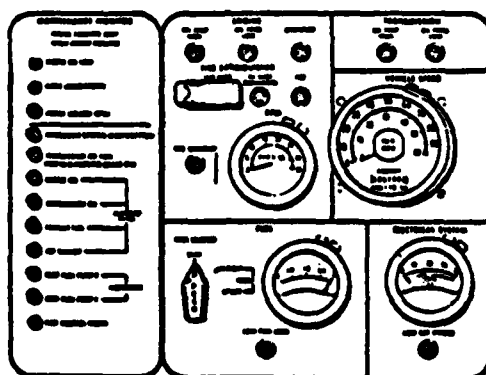
DRIVER'S MASTER PANEL



DRIVER'S ALERT PANEL



DRIVER'S INSTRUMENT PANEL

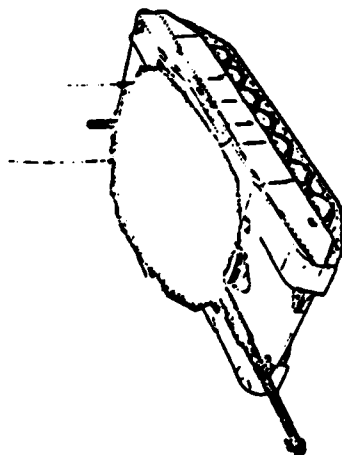


DRIVER'S INSTRUMENT PANEL

LOADER

PROCEDURE GUIDES

M1 TANK



JULY 1981

PREPARED BY THE U.S. ARMY RESEARCH INSTITUTE
FOR THE
BEHAVIORAL AND SOCIAL SCIENCES

GENERAL INFORMATION

This booklet contains M1 loader procedure guides. Each guide is for a single pre-operation, post-operation, or during operation activity. Each guide is matched to TM-9-1350-255-10 (Operator's Manual for Tank, Combat, Full-Tracked, 105 MM, M1).

PURPOSE OF PROCEDURE GUIDES

The guides in this booklet will not take the place of the M1 TM or M1 training materials. The guides will aid you in remembering long or difficult sets of procedures. In short, the guides will help to "jog your memory."

USE OF THIS BOOKLET

The Table of Contents (on the next page) lists the procedure guides in this booklet. Each guide gives you a step-by-step outline for completing an activity. The following will help you to better use each guide.

1. Some steps within a procedure guide are followed by a page number. On that page you will find a detailed breakdown of the step.
2. Some of the procedure guides include a question(s). Each question is stated inside a diamond shape. Your "yes" or "no" to the question will show you which path to follow.
3. Some steps within a procedure guide are followed by a box. In the box you will find more information on the step or a caution/warning.
4. Certain steps within a procedure guide require that a knob or switch be turned to a certain position. In some cases, that position might be written like the symbol to the left. The symbol means that a light should also come on.
5. Pictures of selected panels/equipment can be found at the end of this booklet.



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PREPARE STATION

1. Hatch. Open/lock
2. Crosswind sensor. Erect
3. Weapon. Install (page 2)
4. Loader. Enter station (page 3)
5. Domelight. Adjust
6. Station. Power up (page 4)
7. Intercom. Adjust
8. Seat/platform. Adjust
9. Hatch. Adjust
10. Night vision viewer. Install
11. Guards. Firing position



INSTALL WEAPON

1. Skate lock Lock
2. Azimuth lock . . . Lock
3. Elevation lock . . Lock
4. Weapon Clear (page 13)
5. Mounting pins. . . Remove
6. Weapon Put into mount
7. Receiver/cradle
mounting holes . . Line up
8. Mounting pins. . . Insert



ENTER STATION

1. Loader Enter station
2. Ammo door knee
switch Up
3. Ammo door track. . Clear of objects
4. Ejection guard . . Forward
5. Breech Close
6. Turret traverse
lock Unlock
7. Elevation lock . . Unlock (gunner)

After crew members
in stations



POWER UP STATION

1. Turret power
green light. . . . Assure on
2. MAIN GUN STATUS
SAFE light Assure on
3. TURRET BLOWER. . . OFF
4. GUN/TURRET DRIVE .-~~MANUAL~~-
5. Antenna. Install
6. Amplifier
MAIN PWR NORMAL
7. Amplifier POWER
CKT BKR. -~~ON~~-
8. Amplifier
INT ACCENT ON
9. Amplifier
RADIO TRANS. . . . CDR & CREW



SECURE STATION

1. Guards Stow
2. Night vision
viewer Remove
3. Station. Power down (page 6)
4. Weapon Remove (page 8)
5. Crosswind sensor . Stow
6. Antenna. Remove
7. Loader Exit tank



POWER DOWN STATION

1. Ready ammo door. . Close
2. Ammo door knee switch Stow
3. Hull ammo door . . Close
4. Turret Traverse (gunner) ——— For driver's exit
5. Turret traverse lock Lock
6. Driver Exit tank
7. Main gun Clear (page 9)
8. Ejection guard . . Forward ——— MAIN GUN STATUS
SAFE light on
9. Breach Close
10. GUN/TURRET DRIVE . —~~MANUAL~~—
11. TURRET BLOWER. . . OFF
12. Semi-ready ammo door Close
13. Coax ammo belt . . Stow
14. Amplifier
MAIN FWR OFF

15. CVC helmet Remove/disconnect
16. Downlight. OFF



REMOVE THE M240 MACHINEGUN

1. Weapon Clear (page 13)
2. Mounting pins . . . Remove
3. Front of weapon . . Lift up
4. Weapon Slide back off mount
5. Mounting pins . . . Insert
6. Weapon Stow



UNLOAD (CLEAR) MAIN GUN

1. GUN SELECT . . . ~~TRIGGER~~ ~~SAFE~~
(gunner)
2. Ejection guard . . Forward MAIN GUN STATUS
SAFE light on
MAIN GUN MAY MOVE QUICKLY DURING NEXT STEP
3. GUN/TURRET DRIVE . . ~~EL~~ ~~UNCPL~~
4. Breech Open slowly
5.

IS
ROUND
STUCK
?

YES → See "Manually
Extract Round"
(page 11)

NO ↓
6. Breech handle . . . Upright
7. Round Grasp/pull from breech
8. Round Stow/remove from tank

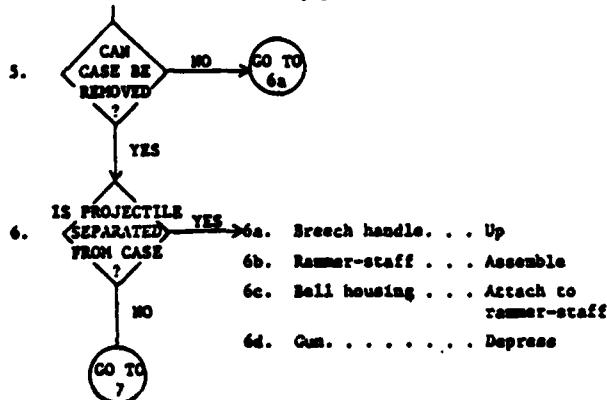
9. Chamber. Clear
10. Gun tube Clear
11. Breech Close



MANUALLY EXTRACT A MAIN GUN ROUND

DO NOT HAMMER ROUND OUT OF BREECH -
ROUND CAN FIRE

1. Breech handle. . . All the way down
(another crewmember)
2. Extracting tool Between breech
head block and round
3. Extractor tool . . . Grasp/both hands
4. Extractor tool . . . Lift up/pull



- 6e. Breech handle. . . All the way down
- 6f. Rammer-staff . . . In muzzle/bell housing against round
- 6g. Round. Push out

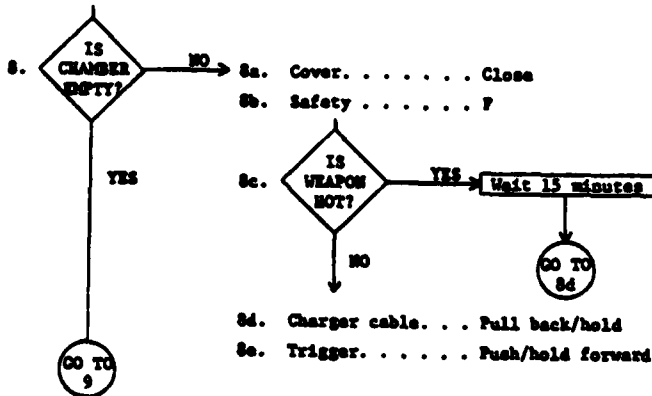


- 7. Round. Grasp/pull from breech
- 8. Round. Stow/remove from tank
- 9. Breech handle. . . Up
- 10. Chamber. Clear
- 11. Gun tube Clear
- 12. Breech Close



CLEAR THE M240 MACHINEGUN

- 1. Safety F
- 2. Charger cable. . . Pull to rear
- 3. Safety S
- 4. Latches. Push in
- 5. Cover. Pull straight up
- 6. Belt Off feed tray
- 7. Feed tray. Raise



8f. Charger cable. . . Slowly forward until
stops, then let go

8g. Trigger. Release

8h. Charger cable. . . Pull to rear ————— Bullet should drop

GO TO
3

9. Trigger. Release

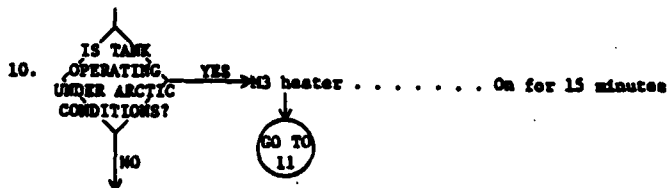
10. Safety S



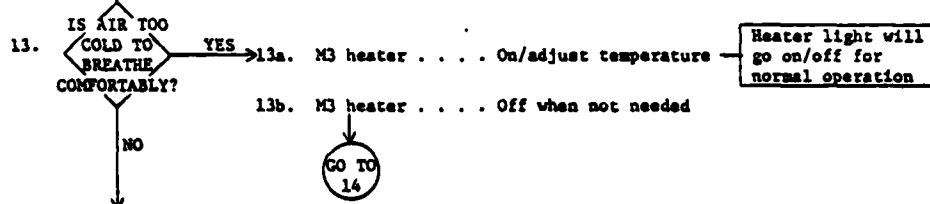
OPERATE/SECURE GAS PARTICULATE FILTER

Operate

1. VEHICLE MASTER
POWER. Assure ON
2. Station. Power up
3. GAS PARTIC
FILTER ON (driver)
4. Mask On
5. Mask Clear and seal
6. Mike lead. Disconnect from
connector
7. Mask mike lead . . Hook up to connector
8. Spring clip. . . . Remove from intake
opening
9. Hose breakaway
socket Remove from mount



11. Hose breakaway Connect to mask socket cannister
12. Breathing. Begin using mask



Secure

14. Hose breakaway Disconnect from mask cannister
15. Hose breakaway socket Connect to mount
16. Mask mike lead Disconnect from connector
17. Mike lead. Connect to connector
18. Mask Off/stow

19. GAS PARTIC FILTER OFF (driver)
20. Spring clip. Install



BEFORE OPERATIONS PMCS

Loader's Station

1. Fire bottle pressure gage. Pressure above minimum for ambient temperature
2. Bottle Secure in mount
3. Turret sensor lenses Clean
4. Hydraulic system oil Check for leaks
5. Reservoir oil level. Add oil if indicator is below ADD 1 GAL mark
6. Filter bypass buttons. In place
7. Radio. Check operation
8. Intercom All crew stations can be heard
9. GAS PARTIC FILTER On (driver)
10. Spring clip. Remove from intake opening

Can operate equipment with minor leaks (Class I or II)

Remote switches and radios working

11. Filtered air hose Remove from connector
12. Airflow. Should be felt
13. Heater On
14. Heater Off
15. Mask Check operation
16. Mike Check operation
17. Spring clip. Replace

Heater lamp lights and heater are working



AFTER OPERATIONS PMCS

Loader's Station

1. Hydraulic system oil Check for leaks
2. Reservoir oil Add oil if indicator level. is below ADD 1 GAL mark
3. Filter bypass buttons. In place

Can operate equipment with minor leaks (Class I or II)

LOADER'S PANEL

